Outline Business Case

UK Centre of Excellence for Decarbonising Roads

North Lanarkshire Council / RP001

21/04/2023

Document Control Sheet

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Elevator Pitch

The construction, renewal, adaptation, and maintenance of the UK's local roads assets make a significant and ongoing contribution to our greenhouse gas emissions, climate change impacts and future resilience. Materials are at the heart of everything we do and embodied carbon in materials represents 40% of the total carbon yield in roads, with additional carbon from scopes 2 and 3 significantly adding to the whole life carbon cost of the materials on our roads. Despite rapid advancements in materials and manufacturing, efforts in the UK remain disparate and isolated. This dramatically limits value for the taxpayer, and scalability, with individual councils tasked with evaluating unproven methods and balancing upfront investments with payoffs in resilience and de-carbonisation. This Live-Lab presents two core elements in response: (1) A UK Centre of Excellence for materials decarbonisation in local roads, comprising standards, knowledge management, a cloud database, global network, and systematic measurement and, (2) A materials testing programme identifying and deploying the top global innovation on UK roads.

The Centre of Excellence for Materials Decarbonisation will identify, develop, demonstrate, showcase, monitor and scale the leading ideas in Material Decarbonisation for the UK local authority sector. This programme of works will focus on delivering an industry recognised and trusted evaluation framework and convening of global networks. Academic partners such as Connected Place Catapult, Transport Scotland and the Manufacturing Technology Centre will help accelerate the adoption of material innovation across the sector.

Senior Responsible Officer: John Ashcroft - Roads & Lands Maintenance Manager

"Reducing the carbon footprint of our Road network activities would significantly contribute to achieving our vision set out within The Plan for North Lanarkshire and our Climate Plan Action on Climate Together 2030. Delighted to be collaborating with our Partners in the development of innovative measures to tackle this critical issue."

Political Champion: Kenny Stevenson - Convener of Communities & Regeneration Committee

"The council declared a climate emergency in 2019 and we have already surpassed our 2022 target by reducing our carbon footprint significantly. We are seeing the impact of climate change with more severe weather and we all must do more to reduce the harmful emissions we produce. As a council, we are well placed to drive and influence a change in behaviour. The transport sector accounts for a large portion of the emissions and here in North Lanarkshire we want to be at forefront of innovation and developing solutions to this crisis. I believe we have assembled an excellent network here and across Scotland which will enable to facilitate the radical shifts required. This is a fantastic opportunity to be a driver for change and make North Lanarkshire a Centre of Excellence to support the whole industry."

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1.1. Overview

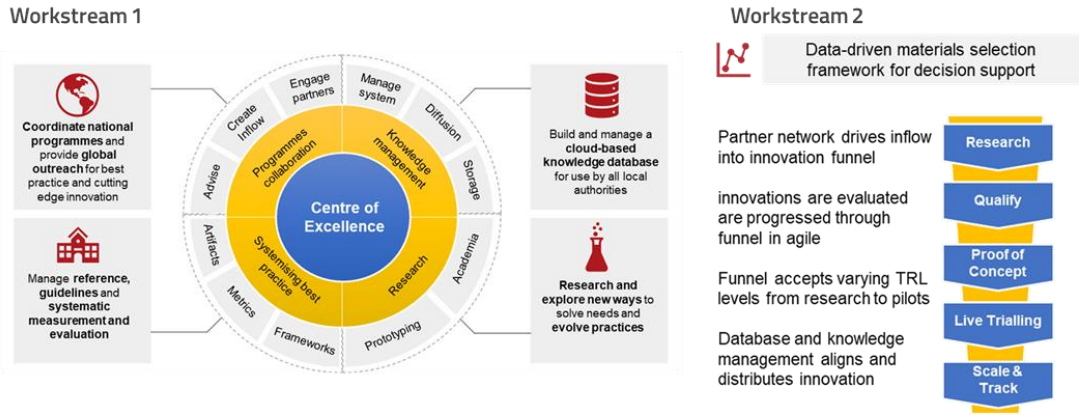


Figure 1: Overview of Workstreams

North Lanarkshire Council (NLC) have been allocated £4,563,550, alongside funding allocated to Transport for the West Midlands (TfWM), to create a UK Centre of Excellence for Materials Decarbonisation in Local Roads. The purpose of the Centre of Excellence will be commissioned to deliver new innovations and solutions from across the national and international communities to the UK Local Authority Highway sector.

Collectively, we will establish *the UK Centre of Excellence for Decarbonising Roads (CEDR),* creating an environment for materials innovation to flourish. The CoE will be a single source of truth for materials testing within the highways sector, developed with a structured and considered approach to innovation, brought to life with game changing innovations from an established, global partnership network. Success will be driven by collaborative working and a common strategic vision across a national partner network. We will draw on all corners of the local authority highways sector, industry and beyond to harness the best from a network of advisors, industry experts, suppliers, innovators, and academic partners. The group's wide-ranging membership, from the UK and international partners, will provide the CoE with diverse skills and expertise, direction and governance and best practice support.

In doing so we will identify, develop, demonstrate, showcase, monitor and scale the leading innovations in material decarbonisation, considering scopes 1, 2 and 3, thus ensuring the whole life carbon impact of any material is taken into consideration. Using an innovation model, developed in the ADEPT Live Labs 1 programme, we will ensure expert consideration is given to the challenges identified and solutions proposed to tackle them.

A Centre of Excellence is needed to ensure innovation knowledge is shared, unnecessary duplication is avoided, and innovations make it into widescale business-as-usual.

1.2. Why?

The industry has been slow to adopt new innovations, especially on low caron materials. There are many reasons for this, including restrictions placed on contractors and suppliers by the specifications of long-term contracts. The industry has added to this through uncoordinated trials, and siloed working practises which leads to wasted resources, duplication work and stagnated progress.

The industry has a plethora of low carbon solutions. The challenge for local authorities is deciphering the potential impact, quality of the material and evaluating whole life carbon to filter out the high quantity of the proposed solutions that would be "green wash". By introducing a centre of excellence model, backed by leading researchers including the Future Highways Research Group with a robust evaluation framework, we will consolidate industry resources and develop a brand which local authorities can trust to adopt solutions tested under the CoE model and not only reduce carbon across our sector but also improving efficiency and cost.

1.3. Why Now?

We are facing a climate crisis and in reaction, North Lanarkshire Council and the West Midlands Combined Authority declared a Climate Emergency in 2019, along with at least 309 other local authorities. Across the SCOTs network and the Transport for West Midlands local authorities, we are working together to collectively respond to this challenge by decarbonising roads, recognising the benefit of working together to tackle this issue and support the journey of our local authorities to net zero emissions.

1.4. How?

The challenges identified will be addressed through two core workstreams, a Materials Innovation Framework and an industry knowledge bank of baselined innovation and materials, underpinned by the CoE.

Workstream 1: Database and Knowledge Bank

The CoE will develop and trial an open access platform to give all local authorities access to the latest information on innovative low carbon materials and best practise for processes for all highway assets, ensuring a fence to fence approach. Before being included on the platform, materials will be evaluated against a common baseline with critical success factors considered. The platform will store case studies on successful and unsuccessful innovations to ensure work is not duplicated, and valuable lessons learned are shared industry wide.

Workstream 2: Smart Materials Testing Programme

Building off of the CoE, Workstream 2 comprises the delivery of an agile innovation funnel, that identifies, develops and tests cutting edge innovation from around the world. North Lanarkshire, Amey and the project partners will undertake a detailed assessment of the materials market and manufacturing techniques to fully understand the current and future capabilities of the market. After which, we will utilise the global partnership network to generate and pull through innovations that have the potential to drastically lower the carbon lifecycle of our materials and assets. These will be baselined against the FHRG carbon principles and added to the established database.

1.5. Where?

Testing will take place across multiple demonstrators' sights in both a "North and South Campus". The South Campus will based in the West Midlands with demonstrator sites across region. The North Campus will be in North Lanarkshire and is covered in this Outlined Business Case.

1.6. Who?

North Lanarkshire Council, Transport for the West Midlands, Amey, Colas, the FHRG and other project partners outlined in this document.

2. The Strategic Case

Content	ADEPT & DfT Requirements	Section
Live Labs Vision	How your proposal meets Live Labs 2 Vision and Principles	2.1
Policies and Strategies	How it meets national, sub-national and local policies and strategies	2.2
Future Challenges	How it addresses future challenges not covered above	2.3
Partners	Confirmation of partners, roles and any funding sources / leverage	2.4
Drivers for Change	A description of the drivers for change	2.5
Location Maps	Details of process / locational maps where appropriate	2.6
Theory of Change	Detailed theory of change / logic map for your proposal	2.7
Impacts	Details of how you will measure impacts and how these link with M&E activities	2.8

Table 1: ADEPT & DFT requirements for Strategic Case

2.1. Live Labs 2 Vision

The principles have been grouped into the 5 distinct categories and displayed in the figure below.

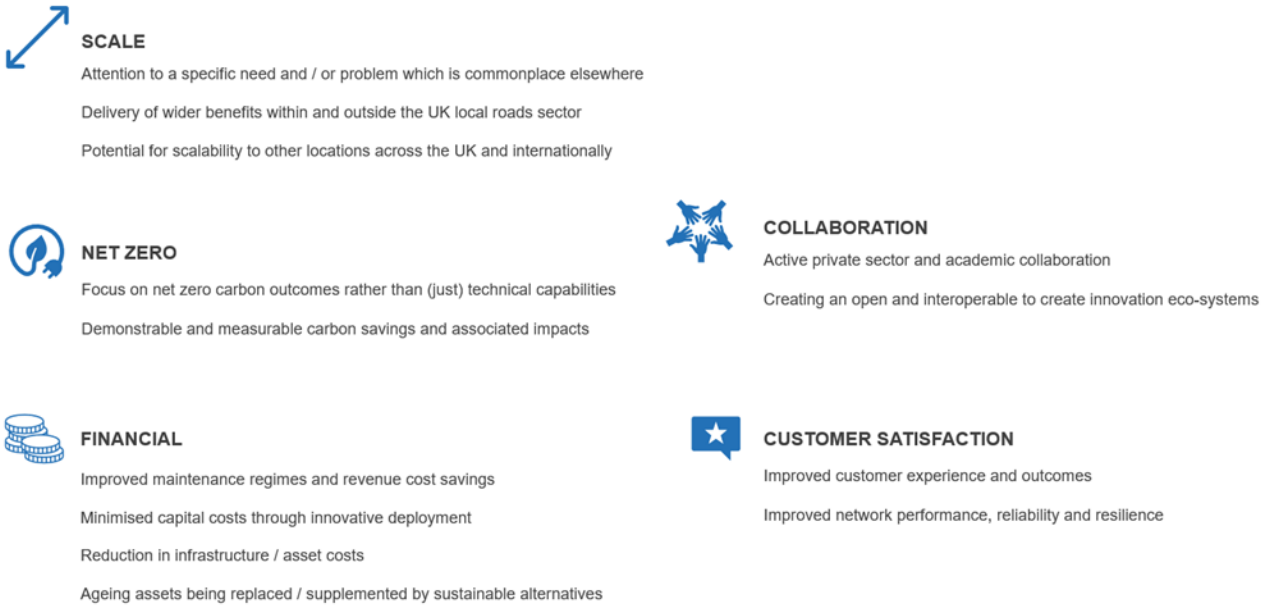


Figure 2: Live Labs principles

2.1.1 Scale

- The challenges in the materials market have been identified through consultation with multiple local authorities and across a series of workshops.
- Embodied carbon (CO_2e) in materials constitutes around 40% of the carbon footprint of road construction and maintenance with significant additional associated carbon in the transportation, distribution, sourcing and maintenance of materials and assets.
- The challenges are representative of the materials market across the highways sector.
- The Centre of Excellence model focuses on utilising the extensive partnership network, relationship with The Design Manual for Roads and Bridges (DMRB) and excellent comms

strategy to ensure materials are fit for purpose, industry approved, not duplicated and success is scaled across the local highway authority market.

2.1.2 Net Zero

- Embodied carbon (CO2e) in materials constitutes around 40% of the carbon footprint of road construction and maintenance, with significant additional associated carbon in the transportation, distribution, sourcing and maintenance of materials and assets. There is a plethora of ways in which we can attempt to solve this; through recycling, optimisation of supply and demand and cutting-edge materials that carry inherently lower embodied carbon. Furthermore, materials that drive resilience can also create positive carbon impacts long-term, for example, if a material with 50kg CO2e/tonne lasts in the road for 20 years, its effective footprint is 2.5kg CO2e/tonne/year. If, however, more care is taken and all best practice is adopted to extend the life to 40 years, this drops to 1.25kg CO2e/tonne/year.

2.1.3 Financial

- The CoE model proposed will generate financial savings for the Highway market, testing materials within a stable, industry standard environment.
- As the programme progresses and co-ordination of testing across the industry improves, the current high level of duplication will decrease and local authorities will be able to learn from each. This is opposed to the current state-of-play in which multiple local authorities spend public money testing the same materials, unaware it was trialled and tested in another area. A collective industry approach driven by a well-funded and co-ordination Centre of Excellence will drive significant savings.
- Focusing on reducing the carbon and harmful pollutants that are emitted as part our construction and maintenance of the roads in North Lanarkshire / across the West Midlands will lead to direct improvement in air quality. The target of the programme is to reduce to carbon output in the materials we used by 25% by 2026 and 50% by 2030.

2.1.4 Customer Satisfaction

- Increased air quality and lower carbon improves the experience for all using the road or footpaths.
- The impacts of climate change and future mobility will all be a focus when considering the “materials of the future”. This will ensure our roads are built with resilience and design required, leading to reduced downtime, maintenance and other activities which disrupt the network for the customer.

2.1.5 Collaboration

- The Centre of Excellence model brings together over 20 different organisations, spanning the public, private and academic sector. This includes TMC providers, SMEs, 3 University’s, the MTC, CPC, TRL, industry bodies including SCOTS, National Highways and Transport Scotland.
- Workshops, expert groups, and design thinking programmes will bring together leaders from across the industry, supported by a tested and proven innovation framework, developed in Live Labs 1. This will lead to high functioned collaboration and innovation ecosystem required to tackle the challenges faced by the local authority highways market.

2.2. Policies and Strategies

National

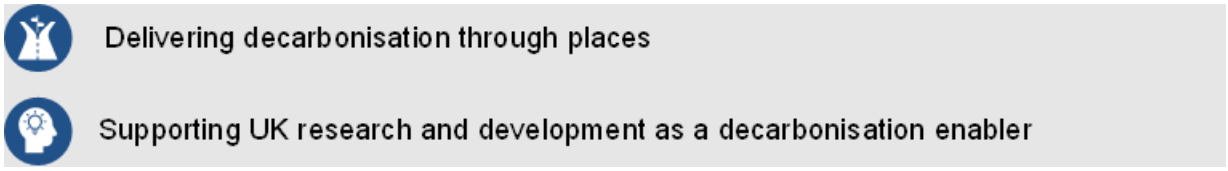
In 2017, the government outlined its strategic ambition to reduce greenhouse gases and to achieve a net carbon growth position for the UK. Since then, there have been various strategies and policy statement that have been released that the Live Labs 2 programme will support.

1. Clean Growth Strategy

Clean growth means growing our national income while cutting greenhouse gas emissions. Achieving this is at the heart of the UK's Industrial Strategy and will increase productivity, create jobs and help protect the climate and environment upon which we and future generations depend.

2. Decarbonising Transport - A Better, Greener Britain

This strategy sets out how the government is going to achieve its ambitions to decarbonise our transport sector and deliver the carbon emission reductions required. Whilst there are many ambitions outlined in the document, our proposed Live Labs projects specifically support the following commitments:



Alongside this strategy, the Department for Transport has also initiated a Carbon Management Programme to embed an integrated system for managing whole life carbon of infrastructure projects at a portfolio level. This is complemented by wider government efforts to reduce emissions from construction, as set out in the National Infrastructure Strategy and Construction Playbook. Reducing the embodied emissions associated with transport, for example, the materials used in construction

3. National Infrastructure Strategy

The government wants to deliver an infrastructure revolution: a radical improvement in the quality of the UK's infrastructure to help level up the country, strengthen the Union, and put the UK on the path to net zero emissions by 2050.

4. Net Zero Strategy: Build Back Greener

The Net Zero Strategy, published in October 2021, sets out the vision for transitioning to a net zero economy and outlined the path to hit the 2050 target. Within the strategy, resource efficiency is a key element of reducing emissions across the economy. Resource efficiency, one of the key components of our Live Lab project, measures reduced emissions from industrial processes by keeping products and materials in circulation for longer by way of reuse, repair, remanufacture and recycling as well as reducing material usage. In doing this we can retain the value and potentially create new value at a much-reduced environmental impact.

This strategy also states the government's commitment to moving to a more circular economy by keeping built assets and materials in use for longer by reusing and making greater use of secondary materials.

Our Live Labs projects also supports Principle 1 within the strategy to minimise the 'ask' by sending clear regulatory signals. We aim to support any change to standards throughout the project to support the industry achieve its ambitions.

5. Climate Change Committee 2022 Progress Report

This report from the Climate Change Committee to Parliament is an assessment of the Governments performance in combatting climate change. Within the report is a summary of the range of actions and conditions that combined, enable decarbonisation of surface transport and how this works together to deliver the sectors decarbonisation pathway. A key enabler of this is "behaviour to reduce waste" which, through our Live Labs working with Behavioural Insights we will identify and work towards.

Sub National

1. Transport Scotland

National Transport Strategy 2022-2023 is clear that, as we transition to net zero, we are committed to doing so in a way that is fair and in accordance with the Just Transition principles:

- support environmentally, and socially sustainable jobs;
- support low carbon investment and infrastructure;
- develop and maintain social consensus through meaningful engagement with workers, communities, NGO's business, industry and other relevant groups;

There is a clear correlation between the objectives of the North Lanarkshire Live Labs project and the National Transport Strategy published by Transport Scotland, specifically the support and investment in low carbon road infrastructure and in supporting environmentally, and socially sustainable jobs.

2. The Society of Chief Officers of Transportation in Scotland (SCOTS) Business Plan 2022

Our Live Labs programme supports the following goals outlined the SCOTS Business Plan:

- the intention to reduce carbon across the Scotland Transport network. SCOTS members, as Chief Officers in each Council, have a key role in managing considerable physical assets, supporting, and delivering local sustainable economic growth and opportunity, reducing the carbon footprint of our activities, and improving quality of life.
- Prioritises in boosting investment and innovation, supporting inclusive growth and maintaining a focus on increasing internationalisation. The approach to delivering the Strategy is underpinned by four priorities for sustainable growth: • Investing in our people and our infrastructure in a sustainable way; • Fostering a culture of innovation and research and development.

Local

1. North Lanarkshire Council 2030 Climate Plan

In North Lanarkshire we recognise the responsibility we have across our local authority and want to reduce carbon in every aspect of our service delivery. Our transportation network contributes significantly to our carbon output and the materials we use on our transportation network is a notable contributor. In line with our Climate Plan ACT2030, first of a series of climate-related documents to be published that encompasses the council's own climate

emergency declaration and its target of net-zero emissions by 2030 and in it you will find information on:

- The climate and biodiversity emergency
- North Lanarkshire and its emissions
- Planned policy that will facilitate area emission reductions
- North Lanarkshire Council emissions, its specific targets and carbon management

Our Live Labs programme will play a critical role in not only reducing the carbon footprint of our road services but strategically enable to behaviour change across the organisation.

2.3. Future Challenges

2.3.1 Future Mobility

The most impactful way to remove carbon from highways delivery is either to not build or to increase resilience (PAS 2080). HGVs and buses cause 90%+ of highway damage, while new mobility modes (Connected and Autonomous Vehicles, Electric Vehicles, Green Hydrogen Vehicles and Micro mobility) present novel challenges for infrastructure providers. Current efforts to mitigate are uncoordinated across sectors. This Live Lab presents a strategic innovation programme to: (1) identify and forecast critical impacts from HGVs, buses, and future mobility on roads, (2) lead the development of a suite of materials that can prepare the sector for the sweeping shifts in our mobility landscape.

2.4. Partners

2.4.1 Amey PLC

Amey are the current term maintenance contractor for North Lanarkshire Council and will undertake the role as the strategic partner throughout the programme. Amey has experience in the delivery of two live lab programmes. Amey's role will include, but not be limited to the follow: project management, carbon analysis, strategic insight, demonstrator management, business system build, communication activities, monitoring and evaluation, procurement of professional services and installation of materials for live trials. It should be noted that Amey will be constantly acting as a supporting partner with the lead and final decisions taken by North Lanarkshire.

2.4.2 The Society of Chief Officers of Transportation in Scotland (SCOTS)

The SCOTS group will lead and co-ordinate the views of the Scottish Local network, ensuring outputs from the programme are relevant and applicable for their members. SCOTS group and members from different authorities will provide guidance and expertise for the selection, development, testing and scale of different solutions. It is anticipated that successful innovations would begin to be scaled across the SCOTS network after 18 months on the programme.

2.4.3 Transport Scotland

Transport Scotland will form part of core group of advisors and evaluators to the programme. A member from Transport Scotland will sit on the programmes advisory panel, providing advice and insight into the material selection and evaluation process. The panel member will also act as the gate keeper to the breadth of knowledge across the organisation and reach back when specific advice is required or sought. Transport Scotland will also provide historical information on materials and innovations trialled across the Scottish network and act as critical partner in the scale of any successful trials.

2.4.4 Transport for the West Midlands (TfWM)

TfWM will be the Centre of Excellence's partner authority for the live labs programme, delivering under the theme of a *"UK Centre of excellence for materials – providing a centralised hub for research and innovation for the decarbonisation of local roads materials, developing a knowledge bank, real-life conditions testing and sharing and learning insights: North Lanarkshire Council & Transport for West Midlands."*

NLC and TfWM will deliver the two projects under the same theme, with the project outputs baselined against the FHRG standard and evaluated using a common carbon approach as outlined in the Carbon Case. The two projects will also share and pool resource for: project management, the Connected Places Catapult Accelerator Programme, Carbon Evaluation, FHRG Live Labs support, programme governance and other elements of the two programmes.

2.4.5 Heriot Watt University

Heriot Watt University will support as an academic partner for innovation research, review and idea generation.

2.4.6 The Connected Places Catapult

Within our Live Labs Programme for materials decarbonisation, will deliver a three phase programme, focusing on international innovation scouting and sector playbook development.

2.4.7 The Manufacturing Technology Centre

The Manufacturing Technology Centre (MTC) was established in 2010 as an independent Research & Technology Organisation with the objective of bridging the gap between academia and industry. The MTC has been engaged with numerous projects focusing on the research and testing of the recycling of materials and circular economy ecosystems. The MTC will be part of the core delivery team for workstream two. This will include, hosting specialist ideation workshops, providing specialist materials testing, support organisation accelerate innovations from the lower end of the technology readiness levels (TRL) through the upper levels to prepare for testing within our live demonstrator environment.

2.4.8 Behavioural Insights

Behavioural Insights will provide a consultancy service into the behavioural practices within the local authority and innovation ecosystem established by the centre of excellence. This will produce insight into how solutions can be designed to maximise take-up and impact - in this Live Lab that will involve influencing the behaviour of both individuals and teams within all the organisations that deliver road maintenance'.

2.4.9 Innovators and Suppliers

The following is a list of suppliers and innovators who we engaged with and who have agreed to be part of the programme. There has been no direct finance committed to any of the organisations. They have instead agreed to form part of our supply chain and participate in workshops, offer ideas and innovations.

University of Bath, Warwickshire Manufacturing Group, Aggregate, Breedon, Singapore Road Research Centre, Office of research, development, and technology at the turner-Fairbank highway research center (USA), Carbon Crusher, Europe's Road Research Centres, Roadways - Innovation, research and development centre, Centre for Advanced Materials and Structures (Singapore), University of Sussex and Tarmac.

2.5. Drivers for Change

2.5.1 **Lack of systems thinking** – siloed working, and lack of interconnectivity in carbon modelling between highways services and Local Authority operations/functions has limited progress in de-carbonisation, as critical opportunities are missed. A Centre of Excellence model led by the industry is best placed places to address this challenge and drive change in working practices and behaviours

2.5.2 **Carbon measuring and tracking** – our tools tend to focus on blacktop rather than the whole life carbon of all of our road materials. It is vital we take a balanced view of all the materials we use in the build and maintenance across all of our road assets.

2.5.3 **Piecemeal application of new tech** – despite emerging technology becoming available, such as bio-binders, plastic roads, advanced plant and machinery and data analytics, their application has remained isolated and unvalidated, preventing widespread adoption.

2.5.4 **Scope 3 & fugitive emissions** - fugitive emissions across the value chain of our road maintenance remain un-tracked and un-managed, while we still remain unclear about a significant amount of Scope 3 within our LHA

2.5.5 **Effective decision making that balances decarbonisation against other needs –** there is no existing systems-approach to balance environmental and economic needs of highways. For example, the impact decarbonisation has on the reliability, safety, and performance of highway networks, or even a true understanding of a material's economic potential rather than simply delivering a pure carbon reduction.

2.5.6 **Legislative restrictions** - authorities face legislation that prevents them changing or deviating from the standard practices that are often the main contributors of carbon across our value chain

2.5.7 **Materials under pressure** – with increasing temperatures due to the changing climate, innovation in highways materials is urgently needed to optimise highway infrastructure thermal and functional resilience and deliver net zero

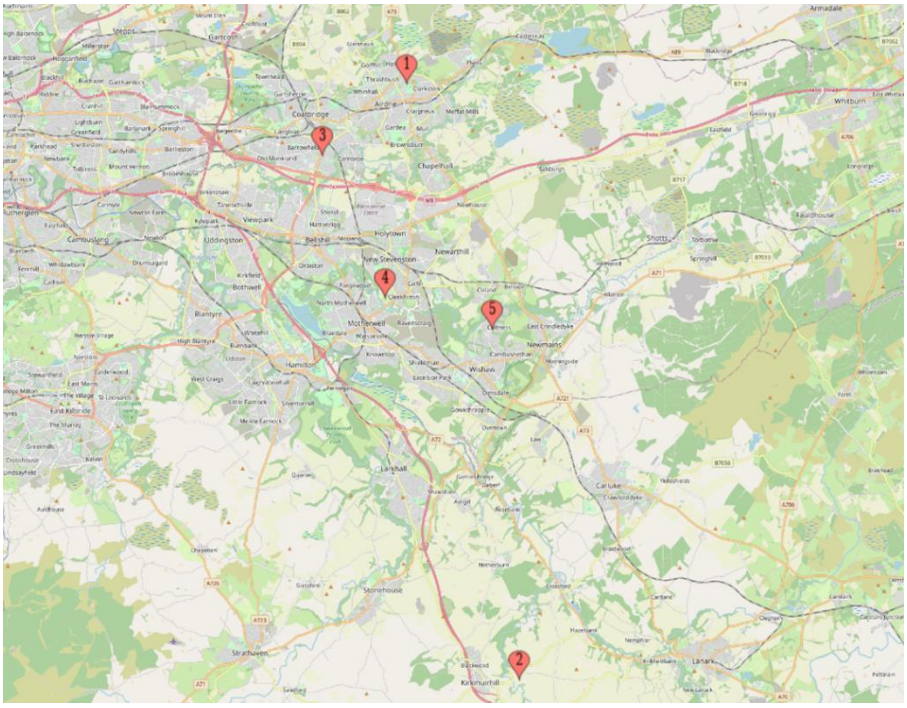
A series of workshops and consultations between North Lanarkshire Council (NLC), Amey and several partners (Trafford Council, Kent County Council, Sheffield Council, Brighton Council, Heriot Watt University, the Future Highways Research Group (FHRG) the Manufacturing Technology Centre and members of the Society of Chief Officers of Transportation in Scotland (SCOTS) identified a set of key challenges and opportunities within the materials space, that are set out in figure 1.

We are confident that these challenges are representative of those faced across the industry and materials market, based on the diverse geographies, industry backgrounds and services providers of those surveyed.

2.6. Location Maps

Detail selection process will be outlined and included. Locations for testing will be selected based on the required test conditions and confidence in the material.

North Campus Test Sites



Test Bed 1: North Lanarkshire: A73, Stirling Road (Crash Barriers, Kerbs)

Test Bed 2: North Lanarkshire: B779, Lancaster Road (Road Surface & Structures)

Test Bed 3: North Lanarkshire: A725, Whifflet Street (Soft Estate & Road Surface)

Test Bed 4: North Lanarkshire: B7001, Old Edinburgh Road (Signage)

Test Bed 5: North Lanarkshire: Station Close (Road Surface)

Figure 3 - Test Bed Locations

Other test beds & locations may be determined at a future date, depending on the nature of the innovation being trialled.

2.7. Theory of Change

2.7.1 Logic Map

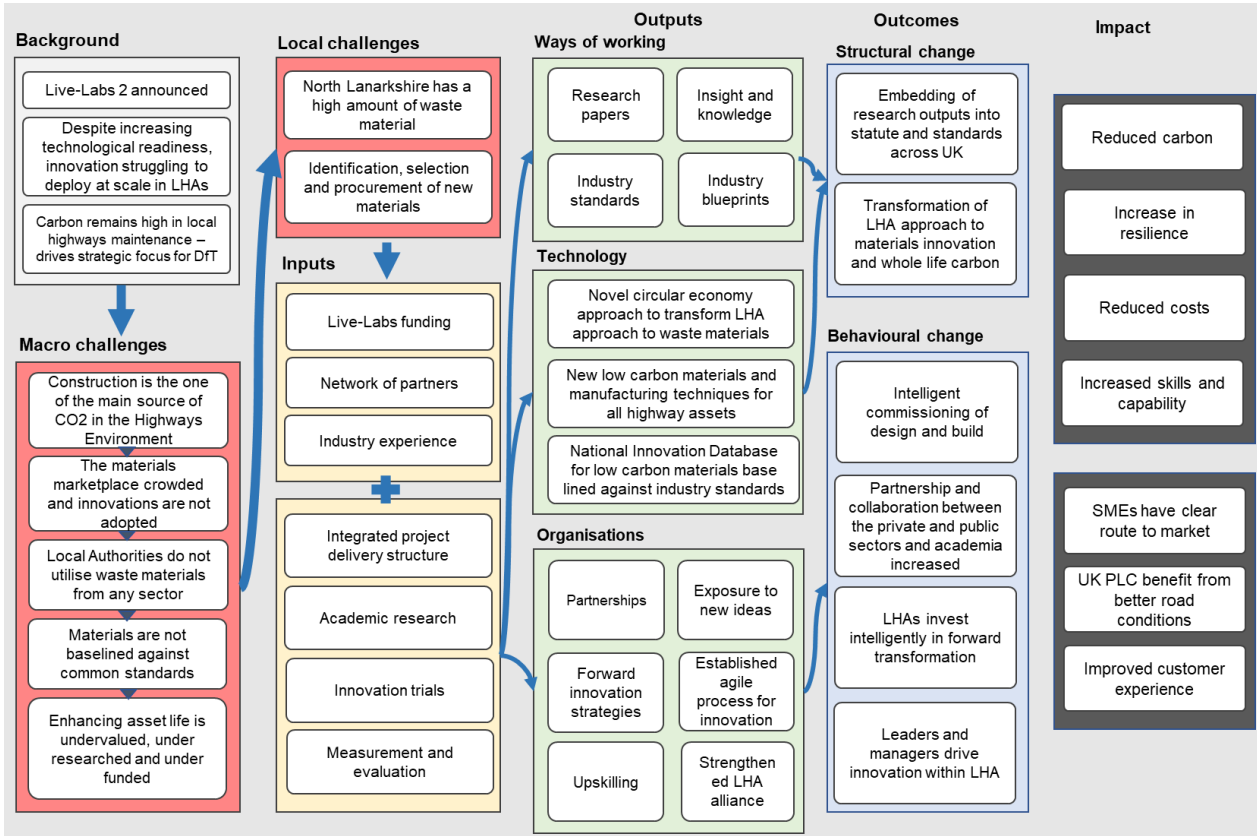


Figure 4: Logic Map

2.7.2 Golden Thread

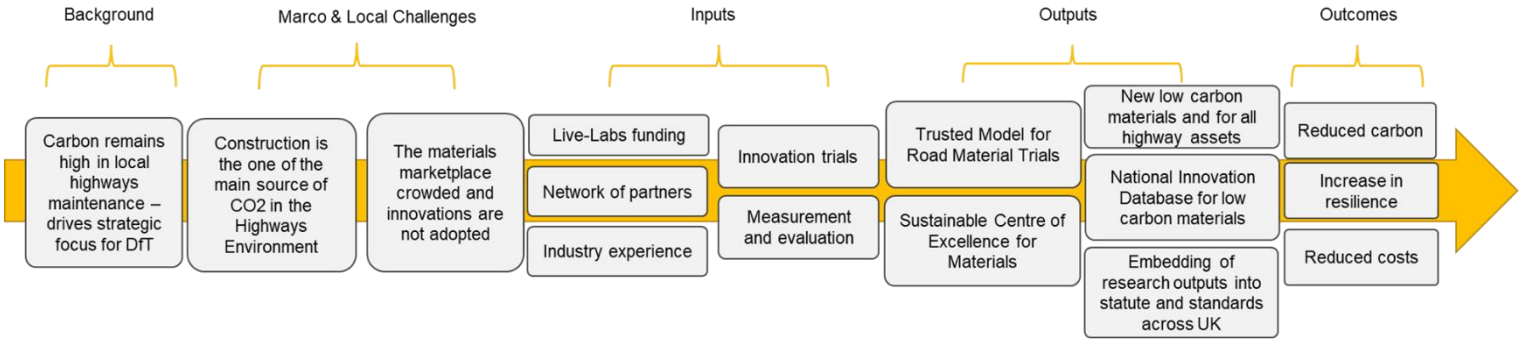


Figure 5: Golden Thread

2.8. Measuring Impacts

Details on the impacts and method of measurement can be found in section 7 of this document.

- **Carbon:** Carbon will be measured as outlined in section 7. We will measure impact by baselining the carbon profiles of all the highway activities in North Lanarkshire Council. We can then assess the impact of all innovations deployed in relation to the impact on the carbon profile on the local authority. Impact will always be considered based on the whole life carbon of the material tested.
- **Sector Impact:** Impact of the Centre of Excellence on the local authority and wider sector and how the macro and local challenges are addressed across the life of the programme.
- **Behaviour Change:** Assessment of the impact of the Live Labs programme on the behaviours, process and decision making across the local authority.
- **Customer:** Impact of the trials on the customer experience, including quality of service, disruption cause by live trialling and customer tolerance to disruption when caused by a sustainable or “green” project.
- **Social Value**: Using the TOMs model, we will assess the social impact of the live labs on the community.
- **Cost:** Cost data will be used to compare the outputs and impact on long-term budget, drive and evaluate efficiency and form the case for future investment in successful trials delivered by the programme.
- **Technical Impact:** Impact of the innovative materials and processes trialled on the quality and technical aspects of the final product, this will include the structural integrity, asset life expectancy and other measures. The direct correlation between asset life expectancy and whole life carbon will not be overlooked in the pre and post evaluation phases.
- **Specifications and Standards**: We will measure impacts of the work at the Centre of Excellence by monitoring the changes or “direction of travel” of the industry specifications and standards, such as the DMRB as a direct result of the work and outcomes from the programme.

3. The Economic Case

The purpose of the Economic Case is to demonstrate public value by comparing the economic performance of the do-nothing scenario, i.e., a business-as-usual scenario, and comparing this to the Do-Something case, i.e., that with the Centre of Excellence for Materials Decarbonisation in Local Roads active, the UK for innovative road materials database and the materials testing programme complete. A Value for Money (VfM) category is assigned by comparing the monetised benefits to the capital and operational costs of the scheme.

Most of the economic benefits from the scheme will come through reductions in embodied carbon and greenhouse gas emissions for end users. As expressed in the Government's policy paper "Valuation of greenhouse gas emissions for policy appraisal and evaluation", these generate an economic value that society places on the prevention of a unit mass emission of carbon dioxide (CO_2) or an equivalent volume of another greenhouse gas factored by its Global Warming Potential (GWP) relative to that of CO_2. Benefits are therefore expressed in £ per tonne of CO_2 equivalent (CO_2e).

The value of a tonne of CO_2e at 2020 prices is expressed in Figure 6*: Value of emissions, £ per tonne of CO2 equivalent, 2023 prices and values*

. The central series represents the core value calculated while the low and high series represent a 50% uncertainty in the values, lower and higher respectively.

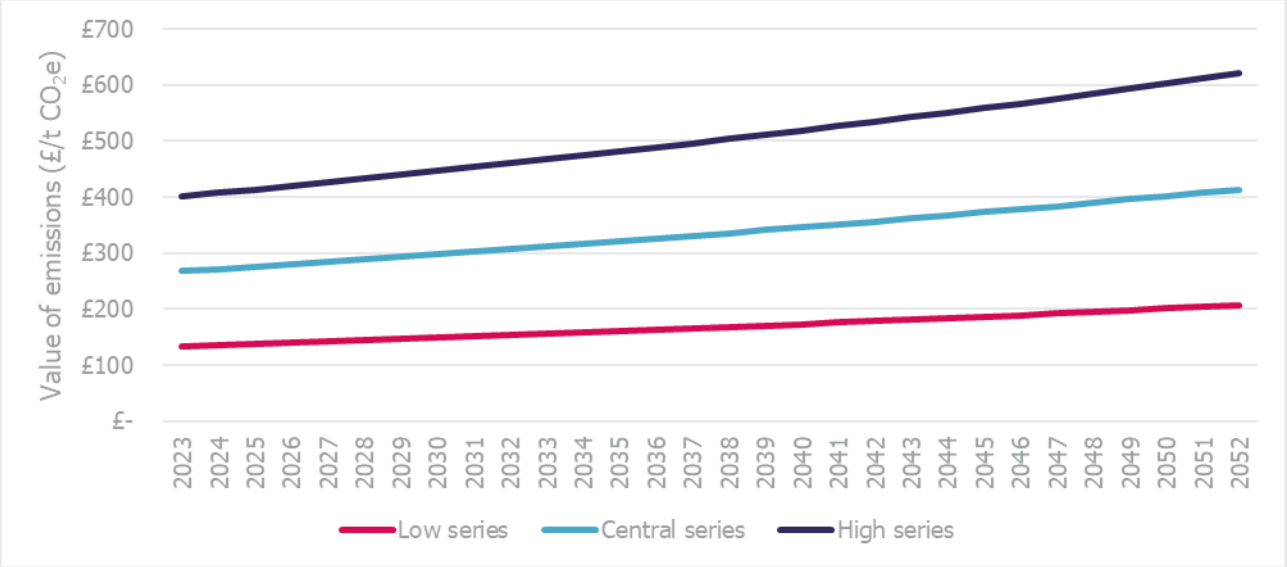


Figure 6: Value of emissions, £ per tonne of CO2 equivalent, 2023 prices and values

All benefits and costs should be rebased to the Present Year of 2020 (the Government's price base year for CO_2 emissions) using the Government's GDP Deflator series. This accounts for the impacts of inflation on costs occurring in the future. All values are further discounted to represent the social time preference for the consumption of goods and services now rather than in the future. Using guidance from the Green Book, a discounting rate of 3.5% per annum should be applied to all benefits and costs which occur in the years beyond 2020.

Content	ADEPT & DfT Requirements	OBC section
Value for Money	A proposed value for money category(s) for the investment proposal (using DfT VfM framework) reflecting the Benefit-Cost Ratio, non-monetised impacts and risks and uncertainties.	3.1

Benefit-Cost Ratio	Projected Benefit-Cost Ratio(s) informing the value for money category with a breakdown of the estimated costs and benefits and discussion of any significant risks and uncertainties that might influence a scheme's value for money	3.2
Sensitivity Testing	Sensitivity testing to provide an understanding of the impact of the risks and uncertainties	3.3
Metrics	Key metrics such as projected infrastructure costs, supporting costs, and costs per tonne of carbon saved	3.4

Table 2: ADEPT & DFT requirements for Economic Case

3.1. Value for Money

The Value for Money (VfM) Category will be determined by dividing the present value of benefits by the present value of costs. This Benefit to Cost Ratio (BCR) will be assigned a Value for Money category will be identified according to the Department for Transport's Value for Money framework.

The Innovation Project itself is unlikely to recoup its costs since it represents an experimental phase where the emphasis is on increasing knowledge, not generating benefits. The BCR is therefore likely to be less than 1 and the VfM category will be poor. As described below, the Trial Stage is calculated to deliver a BCR of 3.25 over a 20-year renewal period. This represent a High VfM category.

3.2. Benefit-Cost Ratio(s)

The innovation project will drive benefits overall, as well as those observed directly in the trial stage (the low carbon materials testing) and those from the Centre of Excellence Database.

3.2.1 Innovation project

Successful innovation is vital to delivering net zero emissions, a key factor in harnessing talent to drive growth across the UK, and critically is an enabler for improving the services we provide to the travelling public. Whilst innovation is critical, the industry has been slow to adopt new innovations, especially low carbon materials. There are many reasons for this, including restriction placed on contractors and suppliers by the specifications on long term contracts. The industry has added to this through uncoordinated trials and knowledge not shared across the industry.

One of the key benefits of the Live Labs programme is that it recognises that whilst innovation is critical it also needs to be carefully managed to ensure the realisation of benefits.

As part of our project, we want to highlight the economic benefit of innovation management which will be monitored and measured throughout the project;

- Faster introduction of new products and higher launch success rates;
- Earlier detection of non-viable ideas and better plans for implementation;
- Greater monetary efficiency;
- Better correlation between all departments for quicker results and improved teamwork and relationships – this includes with other local authorities.

If the innovation trials were to be scaled up for use across the counties, it is anticipated that all the benefits of the trial stage would be increased with economies of scale such as more intensive use of vehicles and digesting equipment likely to result in reductions in marginal costs, improving the Benefit to Cost Ratio (BCR) and Value for Money (VfM) category.

3.2.2 Trial stage

The scheme proposal identifies anticipated benefits and outcomes through iterative and radical testing of new low carbon materials and dissemination of the learning and benefits across the highways network. Therefore, the volume of embedded CO_2e emissions prevented per unit mass of the materials will be determined. This will in turn be converted into a monetary value using the data shown in Figure 6*: Value of emissions, £ per tonne of CO2 equivalent, 2023 prices and values*

. The categories of materials assessed include:

- Asphalt: Existing hot-rolled construction asphalt generates 0.24 tonnes of CO_2e per m^3 A conversion to cold-rolling should reduce this to 0.21 tCO_2e/m^3, but this requires the binder content to increase from 3% to 7% which increases emissions by 0.01 tCO_2e per tonne of asphalt. Given that there are 1,450km of roads in North Lanarkshire, and assuming an average carriageway width of 7.3m and an asphalt depth of between 35 and 50mm, over the 20-year full renewal cycle the reduction in emissions will have an economic value of around £2.17 million.

- Concrete: Existing CEM grade I Ordinary Portland Cement has baseline embedded emissions of 0.91 tCO_2e per tonne of cement. A conversation to grade II/B Ground Granulated Blast-furnace Slag (GGBS) could reduce this to 0.672 tCO_2e per tonne. The British Ready-Mixed Concrete Association estimates that 1.3 million m^3 of concrete is used in Scotland every year with a mass of 3.12 million tonnes; per capita this suggests that North Lanarkshire uses almost 200,000 tonnes per annum. Assuming that the council uses around 5% of this (10,000 tonnes), it could therefore reduce its CO_2e emissions by around 2,400 tonnes, with an economic value of £8.65 million over 20 years. In addition, trials are underway using Impressed Current Cathodic Protection to prevent the need to breakout and replace defective concrete, but the values of this are not yet available.

- Lighting: Existing general European Aluminium has baseline embedded emissions of 6.67 tCO_2e per tonne of aluminium. A conversion to recycled aluminium generated using renewable electricity could reduce this to $4tCO_2e/t$. Given that there are 56,000 lighting columns in North Lanarkshire and assuming an average weight of 18kg per column, over a 20-year full renewal cycle the reduction in emissions will have an economic value of around £490,000. Furthermore, the use of composite columns such as Fibre-Reinforced Polymer or Glass Fibre Reinforced Polyester (GFRP) rather than existing aluminium/steel construction should reduce both the volume of aluminium required and the maintenance burden.

- Rebar: Switching from existing virgin steel to 97% recycled steel should reduce the embedded emissions from 2.9 to 0.53 tonnes CO_2e per tonne of steel. Given an estimate of about 100kg of rebar per m^3 of concrete (1 tonne per 24 tonnes of concrete), 10,000 tonnes of concrete per annum would require around 400 tonnes of rebar. A saving of around 1,000 tonnes of CO_2e per annum can therefore be achieved with a value of around £3.59 million over 20 years.

This is a combined benefit, at 2020 prices and costs, of £14.9 million. Against a cost of £4.584 million, this represents a Benefit to Cost Ratio of 3.25.

As well these economic values, a reduction in emissions will have secondary benefits such as the improvement of air quality and reduction of particulates, as well as promoting improvements in general health and wellbeing with a reduction in health costs and premature deaths. These non-monetised benefits should be considered in addition to the Benefit to Cost Ratio and Value for Money Category.

The production of more durable materials should result in operational benefits for the authority responsible for maintenance as the burden, including for third party transport infrastructure and traffic management providers, as the volume of roadworks required per year is reduced. This in turn offers an economic benefit to road users in the form of Transport Economic Efficiency (TEE) benefits as their journey times are reduced due to encountering roadworks less frequently.

There is a risk that the net benefits will be impacted should the materials in use fail; this will incur extra costs in acquiring different materials that may not be as CO_2e-efficient and installing them in place of the new materials out with the normal maintenance cycle.

3.2.3 Centre of Excellence Database

Separate to the tangible benefits on the small or large scale, the "Centre of Excellence Database" (the open access platform to give all local authorities access to the latest information on innovative low carbon materials and best practise for processes for all highway assets), once complete, is expected to result in efficiencies which will have economic value:

- Standardisation of the "low carbon materials" process should prevent other councils spending in these areas since the research has already been done as part of this project. This will reduce public spending and permit limited council resources to be utilised in other areas.
- This may not be possible to monetise however engagement with the sector to understand all trials will help us understand the savings that can be generated through the life of the project.
- Fugitive emissions are defined as the unintentional emission of gases from pressurised or sealed containers. There is presently little understanding of their scope and impact, but the "Centre of Excellence Database" aims to map these emissions for each trial and through this, reduce them by 80%.
- This may not be possible to monetise as their scope and impact is not presently understood. A qualitative rather than quantitative assessment may be required.

In addition to the direct benefits from emissions reduction, the completion of the Centre of Excellence will permit more efficient use of materials on a wider scale going forward. This will result in less lost time pursuing research that has already been carried out, less local government spending going to waste. While the actual efficiencies will be determined by the testing process, some examples of the levels of emissions reduction achieved in previous studies include:

- Plate steel rebar: the MTC and MetLase have demonstrated a new approach to rebar, producing more accurate and higher performing reinforcement. The plate metal enables flat packing, therefore more efficient transport, and a lower material utilisation than traditional rebar. The group predict a total life cycle carbon reduction of 40%-55%.
- Basalt: researchers at Yale University have been investigating the carbon capture properties of basalt. According to the U.N. Intergovernmental Panel on Climate Change rocks naturally remove 1 gigaton of carbon dioxide a year from the atmosphere. Adding basalt to road surfaces through gritting and other methods could capture over 2 million tonnes of Co2 per year. The material is also available across the UK at a local level, significantly reducing carbon and fiscal transportation costs of the materials, by 25% and 40% respectively.
- Tarmac participated in a trial with the then-Highways Agency, ADEPT and the TRL on the recyclability of asphalt plannings. Through this, the volume of embedded emissions in the aggregate and binder could be reduced by up to 50%[1];

[1] "Driving Down Carbon on Recycled Roads", Colin Loveday, January 2011. www.agg-net.com

- A study at Nantong University, Jiangsu Province, China estimated that a quantitative analysis model could result in a 33.5% reduction in construction, demolition, and renovation waste in the province by 2030[2];
- Research at Stony Brook University, New York, USA investigated the abilities of otherwise unrecyclable concrete to sequester greenhouse gases including CO_2, NO_2 and SO_2 from the atmosphere to offset emissions[3].

3.3. Sensitivity testing

The core assessment scenario utilises the Central series of CO_2e emissions economic values shown in Figure 3.1. It is therefore recommended that the impact of substituting the Low and High series values on the net benefits are considered. These impacts are shown in Table 3.2. The Low Series benefits result in a BCR of 1.62 (Medium VfM category) and the High Series a BCR of 4.87 (Very High BCR).

Category	Central Series benefits	Low Series benefits	High Series benefits
Asphalt	£2.1767 million	£1.083 million	£3.251 million
Concrete	£8.647 million	£4.323 million	£12.970 million
Lighting	£0.490 million	£0.245 million	£0.735 million
Rebar	£3.588 million	£1.794 million	£5.382 million
Total	£14.892 million	£7.445 million	£22.338 million

Table 3: CO_2e valuation sensitivity tests

3.4. Metrics

The key metrics to be measured to quantify the Economic Case are the actual savings in emissions outlined in the Carbon Case, as well as the assumptions on the volumes used by North Lanarkshire Council (particularly the per capita proportion of concrete used, for which there is very limited data, and a subjective assessment has been made using professional judgement). Changes to the government's carbon dioxide equivalent valuations should be monitored and compared to the values shown in Figure 3.1. Further investigation is also required to value the trial stage outputs in terms of their net economic gain for adopters of the database, as well as true values of reduction obtained by the theoretical options described in the research papers in section 3.2.3. The ongoing costs in maintaining the database should also be considered.

[2] Liu, H.; Guo, R.; Tian, J.; Sun, H.; Wang, Y.; Li, H.; Yao, L. Quantifying the Carbon Reduction Potential of Recycling Construction Waste Based on Life Cycle Assessment: A Case of Jiangsu Province. *Int. J. Environ. Res. Public Health* **2022**, *19*, 12628. https://doi.org/10.3390/ijerph191912628

[3] "Recycling Materials to Transform Construction Industry and Address Climate Change", Shrish Patel and Alexander Orlov, Science-Policy Brief for the Multistakeholder Forum on Science, Technology and Innovation for the SDGs, May 2022.

4. The Commercial Case

This is the Commercial Case for the North Lanarkshire Live Labs 2 programme and provides evidence on the commercial viability of the proposal and the procurement strategy that will be used to engage the market.

Approach

The DfT's and ADEPT's guidance document 'Outline Business Case (OBC) Guidance v1', outlines the criteria that should be covered as part of the Commercial Case for Live Labs 2. This has been used as a broad guide in developing the structure and content of the Commercial Case. Table 3 shows where the relevant information, in accordance with the requirements can be found in subsequent sections that make up the Commercial Case.

Content	ADEPT & DfT Requirements	OBC section
Procurement Activities	Clear statement of the projected procurement / intellectual activities	4.1
Procurement Route	The intended procurement routes for the project's key outputs and activities as well as how they will secure the factors outlined in the economic case	4.2
Compliance	How the proposed approach will comply with procurement, subsidy control and, where applicable, state aid regimes inc. Section 151 / 73 officer sign off	4.3
Sourcing Options	The sourcing options available and the rationale for the preferred option	4.4
Procurement Plan	A procurement plan with timescales	4.5
Supply Side Arrangements	Any early consultation with the supply side, referring to any existing supplier or partnership arrangements	4.6
Specification	As so far as is possible, an outline output / outcome-based specification	4.7

Table 2: ADEPT & DFT requirements for Commercial Case

4.1. Procurement Activities

Projected Procurement

The project is a proposal put forward by North Lanarkshire County Council. They will use a number of supply chain partners to deliver the project.

The procurement route for this project is as follows; North Lanarkshire County Council will follow their General Contract Standing Orders and Procurement Strategy to award a contract to the preferred partner, Amey, through the Scotland Excel Engineering & Technical Consultancy

Framework. This arrangement will seek to cover the professional services element of the project which has a maximum value of £2.5m.

Once the contract has been awarded to Amey, North Lanarkshire will allow Amey to procure a consortium of suppliers to support on the project. The procurement of these suppliers will be based upon Amey's Procurement Procedure which looks at quality and best value as key drivers.

4.2. Procurement Route

Procurement Journey Route Map – Supplies and Services (Traditional Procurement Approach (Open, Restricted etc.)) – September 2022

Procurement Area	Route 0	Route 1	Route 2	Route 3
Procurement Risk	Low		Medium	High
Value of Procurement	£0 - £4,999.99	£5,000.00 - £49,999.99	£50,000.00 - £177,896.99	£177,897.00 or Greater
Procurement Regulations	Councils General Contract Standing Orders		Procurement (Scotland) Regulations 2016	Public Contracts (Scotland) Regulations 2015
Responsible for Leading Procurement	Procuring Service Area		Procuring Service Area or Corporate Procurement as Agreed Within Procurement Commercial Pipeline Process	
Method of Executing Procurement (procurement document issue and receipt etc)	Written / Email Exchange	Public Contracts Scotland – Quick Quote	Public Contracts Scotland or Public Contracts Scotland Tender	
Procurement Engagement Document / Contract Strategy Required	No		Yes	
Publication of Contract Notice on Public Contracts Scotland Required?				
Selection Document Set Applicable	Not Applicable		SPD (Scotland)	
Selection Stage Response Opening & Receipting Responsibility			Chief Officer / Head of Service	
Approval of Selection Stage Letters / Notification to Candidates				
Basis of Contract Award	Best Value / Lowest Price	MEAT or Best Value / Lowest Price	Most Economically Advantageous Tender (MEAT) – Quality and Price	
Tender / Quote Responses - Receipting & Opening	Two Team Members Not Involved in the Procurement		Corporate Procurement	
Authority to Approve Contract Recommendation	Chief Officer / Head of Service			Chief Officer / Head of Service – Up to £500k – Committee Above £500k
Standstill Period Applicable?	Not Applicable		Voluntary	Mandatory
Issue of Standstill, Award etc. Letters	Chief Officer / Head of Service		Head of Asset and Procurement Solutions	
Publication of Contract Award Notice	Not Applicable		Procuring Service Area or Corporate Procurement	

Figure 7: North Lanarkshire County Council Procurement Route Map

4.2.1 Professional Services Contract

The figure above shows the various procurement routes that North Lanarkshire County Council is required to comply with when awarding contracts. Given the value of the opportunity being awarded is £2.5 million, North Lanarkshire County Council must follow route 3.

In addition to going through this route the recommendation on the procurement protocols will be presented to the NLC Enterprise and Climate Change Committee on the 3rd of May 2023 for approval. This is a committee made up of local politicians and will help provide approval for the chosen procurement route.

4.2.2 Works Contract

The works element of the project will be procured through existing contractual arrangements with North Lanarkshire's Term Maintenance Partners (currently Amey Public Services LLP). Innovation projects which successfully come through the innovation funnel / governance process for trial, will be secured through this arrangement.

4.2.3 Amey Procurement Procedures:

Once Amey has been awarded the Professional Services Contract, they will follow the subsequent Procurement Policy to onboard a consortium of suppliers.

- Amey assesses the scope of its Services and identifies where there is either a resource issue or the need for a specialist service that would require the engagement of supply chain support
- Our Technical leads propose to our Procurement Manager a schedule of possible Suppliers who can meet the delivery requirements from a technical perspective
- Our Procurement Manager assesses each potential Supplier by reviewing their status under the Constructionline portal; where suppliers are pre-qualified to work with Amey based on their financial / insurance / HSEQ data
- If a Supplier is not on Constructionline then they are sent a link to apply and if they meet the Amey criteria, they are on-boarded into the system
- Once the schedule of Suppliers is agreed they are invited to sign a Services Agreement whereby the contractual terms are agreed and signed off so that Works Instructions can be issued that detail Scope, Programme, Price etc either in competition with their peers or via a direct award; depending on the number of available Suppliers and an assessment of what would be the best value route for the ultimate client

In total this will provide a robust method of procurement suppliers to ensure that quality and best value act as the key drivers for onboarding.

4.3. Compliance

As Figure 8 shows the approach will go through all North Lanarkshire County Councils procurement protocols. This includes getting section 151 / 73 officer sign off from Chief Officers of both Community Operations and Asset & Procurement.

Figure 8: North Lanarkshire County Council Compliance Sign-Off

4.4. Sourcing Options

The sourcing options available for the professional services element of the contract are:

- A mini competition through the Scotland Excel Framework
- A direct award through the Scotland Excel Framework (as described above)

The direct award is the preferred sourcing option (in line with the options available within the Framework) due to these key reasons: to strong existing working relationships; proven delivery of work with the listed partners; commitment, capability, terms already in place via the Excel Framework and capacity to deliver the project and proven experience through direct involvement in previous similar projects (LL1).

The sourcing options available for the works side of contract is a direct award to the Term Maintenance Partner at the time. This is because the works element of the project fit within the scope of our existing term maintenance partnership.

This Outline Business Case will form an Appendix to the Report to NLC Enterprise and Climate Change Committee on the 3rd of May 2023. Thus, they will become aware of the sourcing options and method for procurement. In addition to this, key stakeholders within North Lanarkshire local

council and political arena have expressed support and approval for the chosen method of procurement.

4.5. Procurement Plan with timescales

The estimated timelines are shown below:

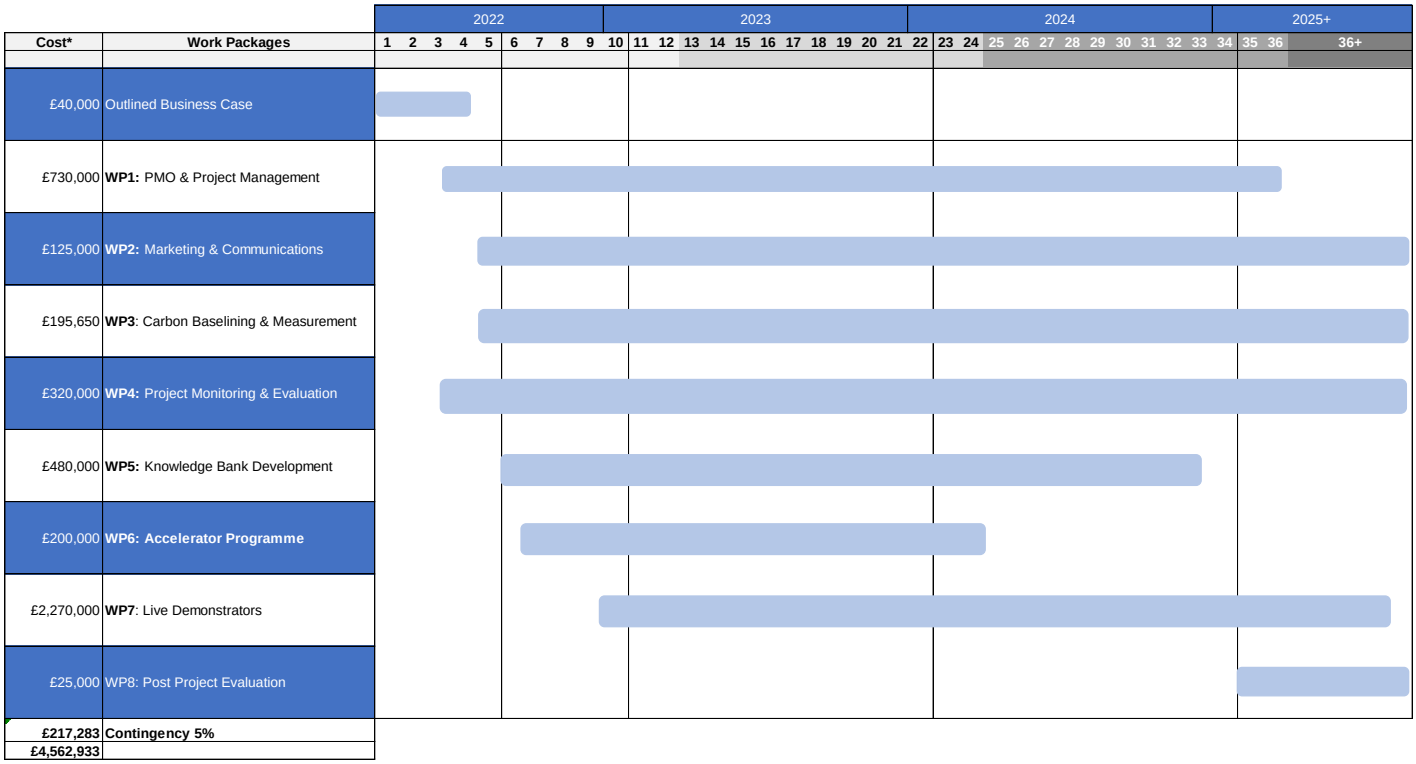


Figure 9: Estimated timelines for the Live Labs 2 North Lanarkshire Project (broken by work streams)

The figure above gives an estimate of the project work packages, their commencement date and their duration. Within each work package we will be using different suppliers to help deliver the workstream.

4.6. Supply Side Arrangements

Early consultation has begun with several key supply chain partners. This is to ensure that all legal, compliance, governance and procurement procedures can be completed in advance of the anticipated work commencement date. Thereby ensuring a quick onboarding and minimal delays to the work starting.

The list below shows the Consortium of Suppliers alongside Amey with whom early consultation has begun:

- The Connected Places Catapult – An established innovation partner of the highway sector.
- Heriot Watt University – The chosen academic partner for the programme
- Future Highways Research Group (FHRG) – FHRG are a leading partner for carbon benefits assessment and have been chosen to align with the specifics of the Live Labs 2 prospectus and their considerable expertise in the industry
- The Manufacturing Technology Centre (MTC) – Selected as a leading innovation partner as they have a unique research and development capability in the materials department

- Behavioural Insights – Selected as behavioural change experts most suited to the live labs programme requirement after engagement with four UK based suppliers.

4.7. Specification

Our aim is to establish “The UK Centre of Excellence for Decarbonising Roads (CoE)”. This will be achieved through close collaboration with North Lanarkshire Council, strategic partners, and a global supply chain. Our strategy will involve engaging with this supply chain, identifying, and reviewing leading innovations, trialling them on a live network and utilising our strategic partners expertise to evaluate and scale successful solutions.

1. To deliver a fit for purpose Centre of Excellence for Decarbonising Roads, with the confidence of the industry to act as a “single source of truth” for material testing and knowledge dissemination.
2. Establish proven research methodologies to ensure outputs from the CoE are reliable and accurate
    a. Ensure research looks holistically when testing new materials
    b. Identify research partners that can provide specific expertise
    c. Look at scope 1,2 and 3 emissions for materials
3. Create a global partnership network to collaborate internationally on testing and developing materials for road decarbonisation.
4. Communicate and promote the usage of the CoE for all Local and Regional authorities
    a. End goal of having a thriving CoE that is trusted by the industry, lowers the carbon footprint of the materials across the road sector and balances the economic and social considerations at every level.

5. The Financial Case

5.1. Financial Responsibility

North Lanarkshire Council will accept the financial responsibility to manage, distribute and govern the funding awards to the local authority. The Live Lab will be integrated into our Roads Asset Management Plan and approach. We will ensure that successful outcomes and learning is shared within our internal environment and around the road's community. Positive innovations will be built into our future works programmes from 2026/27 (for innovations where we are certain robust M&E has been achieved) across the asset groups as appropriate, ensuring an effective sustainable lifecycle approach is adopted. We will work towards developing successful innovations into a business-as-usual approach and manage this through our financial monitoring procedures.

5.2. Financial Viability

The purpose of the project is to create a sustainable Centre of Excellence (CoE) that will continue to trial material innovations after the live lab funding has ended. The purpose of the CoE is to centralise the identification and trialling of new materials, manufacturing techniques and processes for roll out into the sector. For the CoE to be successful in the long-term, it is imperative we spend a significant amount of focus in the initial stages of the programme putting in place the correct foundations and applying a methodology, testing and evaluation process that can be respected and trusted by the majority of the UK local authority network. These measures include the FHRG review carbon review process, sector and academic material technical review, state-of-the-art live demonstrator testing and other measures outlined in this document.

Once this industry trust has been established there are numerous ways the CoE will continue in the long-term and ensure the outcomes and benefits are sustained beyond the live span of the scheme.

The following will all be explored as future operating models throughout the life of the programme, a preferred option will be established in June 2024, reviewed in April 2025 and a finalised plan in September 2025.

5.2.1 Subscription Operating Model

The database will act as a potential revenue scheme, this will be the ultimate "acid test" for the CoE in the five-to-eight-year period from the programme commencing. The time take to establish trust and correct testing process to give the wider industry confidence to in the CoE "rubber stamp" should not be overestimated. Once successful, local authorities and suppliers will pay a small subscription fee to access the database or input solutions for the market to access.

Revenue avenues will also be identified, once the CoE is established, we anticipate the highways materials supply chain will gain recognition and faster adoption rates if innovations are tested as part of the programme and under the established CoE framework. Therefore, our wide supply chain would need to cover all costs related to trialling and certification of the material, which in turn will add value and revenue for the programme. Reducing the associated risks with trialling new materials has the potential to be "game changing" for the local authority sector.

We also anticipate that the CoE will act as a gate keeper and access point for the international market, enabling global innovations access to the UK market ensuring we have the "best in class" available to the UK local authority road sector. Therefore, new entrants to the market will need to prove the concept or quality to the CoE, paying a fee for testing and review and to be listed on the database for local authority adoption.

5.2.2 Industry Body Ownership

It may also be considered, if the programme can demonstrate not only significant carbon savings but cost & efficiency savings, that central government or an industry group funding maybe beneficial to lower costs across the sector. The value of industry testing in a collective manner or failing fast on specific interventions to save replications cannot be overstated as demonstrated in the economic case.

The central government or industry bodies include but are not limited to: The Department for Transport (DfT), The Association of Directors of Environment, Economy, Planning and Transport (ADEPT), Local Council Roads and Innovation Group (LCRIG), Transport Scotland and National Highways.

5.2.3 Future Funding Opportunities

The CoE will work directly with our programme partners and supply chain to seek further funding opportunities from other innovation competitions, such as UKRI, and other nation and global competitions. This will happen throughout the life of the programme and post the live lab funding period.

5.2.4 Enhanced Scope of the CoE

The programme will explore whether a similar methodology and approach can be applied to other local authority highway activities or focus areas, such as digitisation, decarbonisation of industry fleet and plant, the management of biodiversity and the green estate or further high carbon activities across the highway sector.

5.2.5 Programme Benefits

The programme benefits will be maintained beyond the period of the scheme without any further funding through the immediate adoption of viable innovations to Business as Usual (BAU). Benefits from the innovations will be scaled at pace across North Lanarkshire Council's operations and adopted across Amey's core Local Authority, National Highways and Transport Scotland Highway Contracts where appliable. NLC use allocated capital funds to ensure the new ways of working and new low whole lift carbon materials to fund the scale of the innovations.

The programme benefits and outcomes will also be housed on the external dashboard and database, alongside other communication material such as white papers and detail technical reports, which will be maintained for at least 5 years following the end of the programme, enabling other local and national highways authorities to exploit the benefits of the CoE model.

6. The Management Case

Content	ADEPT & DfT Requirements	OBC section
Governance Structure	A diagram illustrating the governance structure and key roles and responsibilities that will be in place to provide controlled and informed decision making	6.1
Stakeholder Map	A description of the key roles, lines of accountability and how they are resourced - identifying the Senior Responsible Owner of the project	6.2
Reporting	Any reporting arrangements to provide key updates on progress and how these mesh with the Live Labs programme cadence	6.3
Support Statements	A clear statement of senior level support from any partner organisations	6.4
Project Plan	A project plan that will be used to track the progress and delivery of the project and its resulting outcomes	6.5, Appendix A
Risk Register	A first draft of what will be an active risk register	6.6, Appendix B

Table 103: ADEPT & DFT requirements for Management Case

6.1. Governance Structure

The UK Centre of Excellence for Decarbonising Roads Programme is a collaboration between North Lanarkshire Council and Transport for the West Midlands to carry out and optimise the trials of low carbon materials on the highway network to achieve decarbonisation targets set out in the Strategic and Carbon Cases.

NLC have identified technical and academic consultants to drive innovation and a programme partner to maintain integration, control, and benefits focus. These parties all work collaboratively within a loose framework allowing agility whilst managing contract scope.

NLC is acting as the prime and will receive and manage the project funding from ADEPT therefore will lead on the reporting and engagement to Adept Commissioning Board on behalf of UK Centre of Excellence for Decarbonising Roads (CoE).

As the recipient of the funds NLC will also be the contracting with the third-party Technical Consultants and the Programme Partner (Amey) to define the scope and deliverables via the contracts.

With regards to the day-to-day delivery of scope, communication, and task management, there are some shared roles such as that of the Technical Consultants and Programme Partner for whom both NLC and TfGM have equal responsibility respective to the work packages. There are then project resources, SMEs and the supply chain that maintains accountability for scope and line management. The solid lines indicate the contractual relationships, and the dotted lines indicate task management only.

6.2. Stakeholder Map

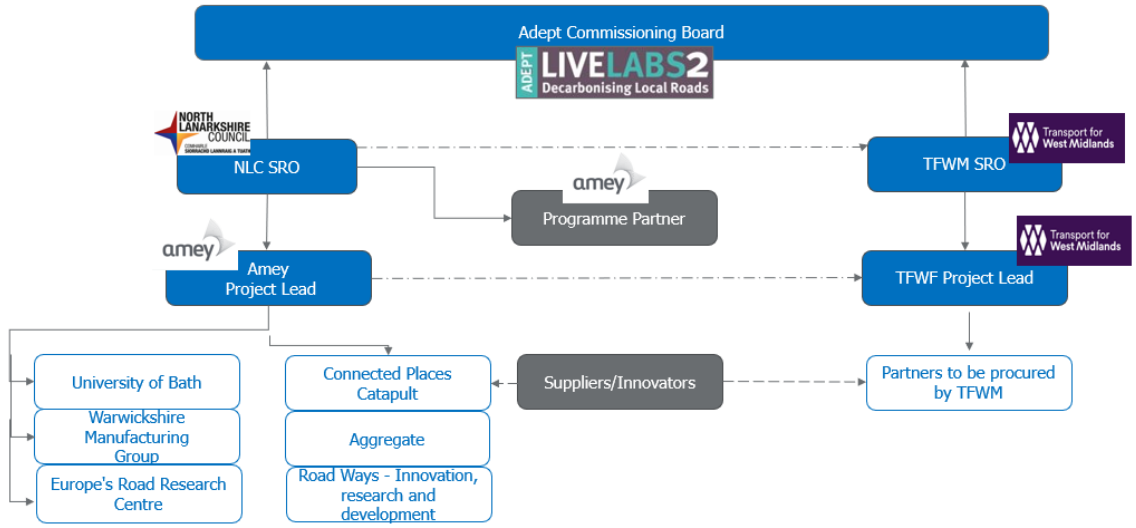


Figure 11: CoE Organisational Structure

Figure 12 sets out the roles and responsibilities for the key resources within the CoE organisation and identifies Key Performance Indicators regarding baseline management (time, cost, scope) and benefits (Carbon, Value, Innovation, System Integration and Knowledge Sharing. NLC and TfWM have both appointed a Senior Responsible Officer who maintain accountabilities for all deliverables and benefits. The SROs have delegated responsibility for technical matters to the technical leads and project mechanics to the project leads within their direct organisation. In turn some of the responsibility has been shared with the technical consultants and programme partner.

	Scope	Cost	Time	Carbon Measurement	Innovation	Value	Integration & Controls	Knowledge Sharing
	Define and deliver scope	Define and manage cost	Define and manage schedule	Define approach and measure	Identify and measure	Identify and measure	Define and implement	Define and implement
SRO (Local Authority NLC & TfWM)	A	A	A	A	A	A	A	A
Technical Lead (Local Authority NLC & TfWM)	R	C	C	R	R	R	C	C
Project Lead (Local Authority NLC & TfWM)	R	R	R	I	I	I	C	R
Technical Consultants(Amey/Colas)	C	C	C	R	R	R	I	C
Carbon Measurement (Amey & FHRG)	C	C	C	R	C	C	I	C
Supply Chain (TBC)	C	C	C	C	C	C	I	C
Academic Research (University of Nottingham, Heriot Watt University, Aston University)	C	n/a	I	C	C	C	n/a	C
Programme Partner (Amey)	R	R	R	I	R	R	R	R
Adept Commissioning Board	I	I	I	I	I	I	I	I
Monitoring & Evaluation Programme	I	I	I	I	I	I	I	I

Figure 12: CoE organisation roles and responsibilities

6.3. Reporting

The ADEPT Live Labs is centred on applying innovative techniques and supply partnerships to break down the limitations to achieving a circular economy and decarbonisation targets. One of the key recommendations within Live Lab Programme Review & Final Project Evaluations April 2022 for

programme management is “with the addition of a programme manager, it is recommended that this low-cost model for programme management and governance is adopted for future, similar initiatives.”

We propose to run a series of rapid outcome focussed sprints that we will run through three phases:

- Optioneering (what proposal shall we trial?)
- Partner Selection (Who are the suppliers and clients?) and;
- Benefits Capture (what have we measured and what is the variance?).

There will be field tests and lab testing happening in parallel and the typical scrum methodology shall be applied to provide clarity to the developers and use daily stand ups to keep stakeholders engaged. The Continuous Improvement or Lean6Sigma approach of Define, Measure, Analysis, Improve, Control (DMAIC cycle) will be key to establishing results quickly and adapt accordingly to achieve the benefits focussed.

Figure 13 sets out the agile delivery approach (albeit longer durations that your typical development sprint)

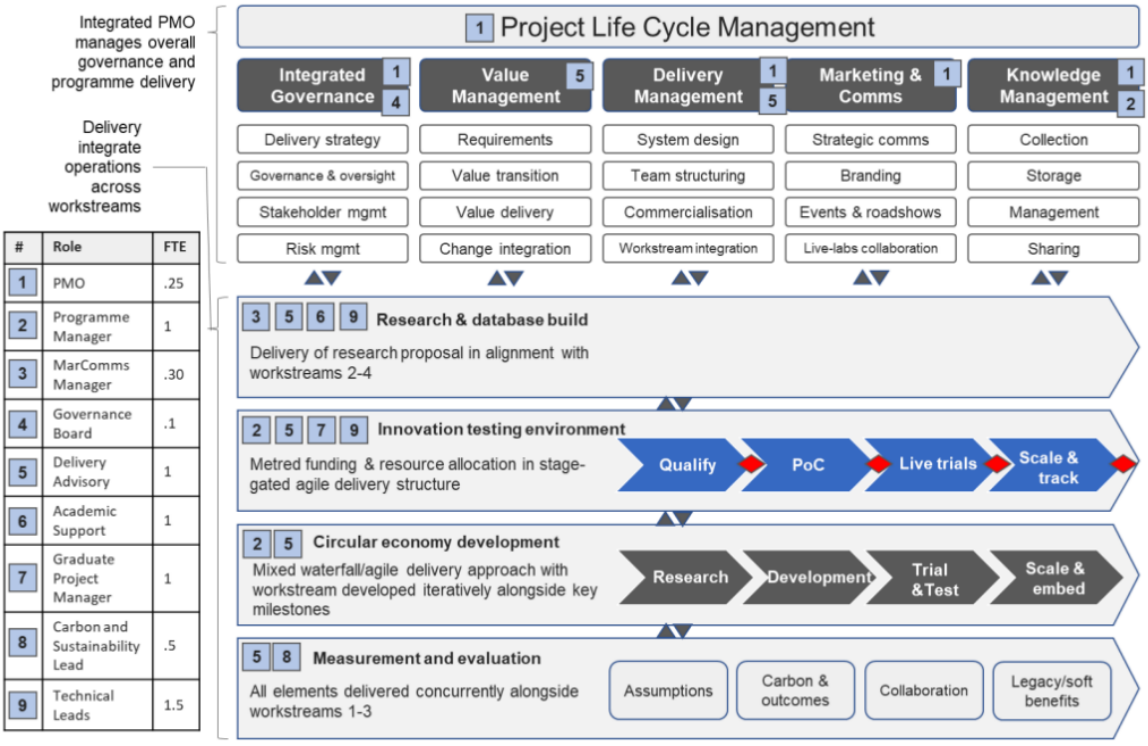


Figure 13: CoE roadmap

A CoE scope boundary has been set out below in Figure14 across two core workstreams:

- Workstream 1: UK Centre of Excellence for Materials and Manufacturing in Highways
- Workstream 2: Smart materials and manufacturing techniques testing programme

High level proposals are made all of which require feasibility, partner selection and benefits capture.

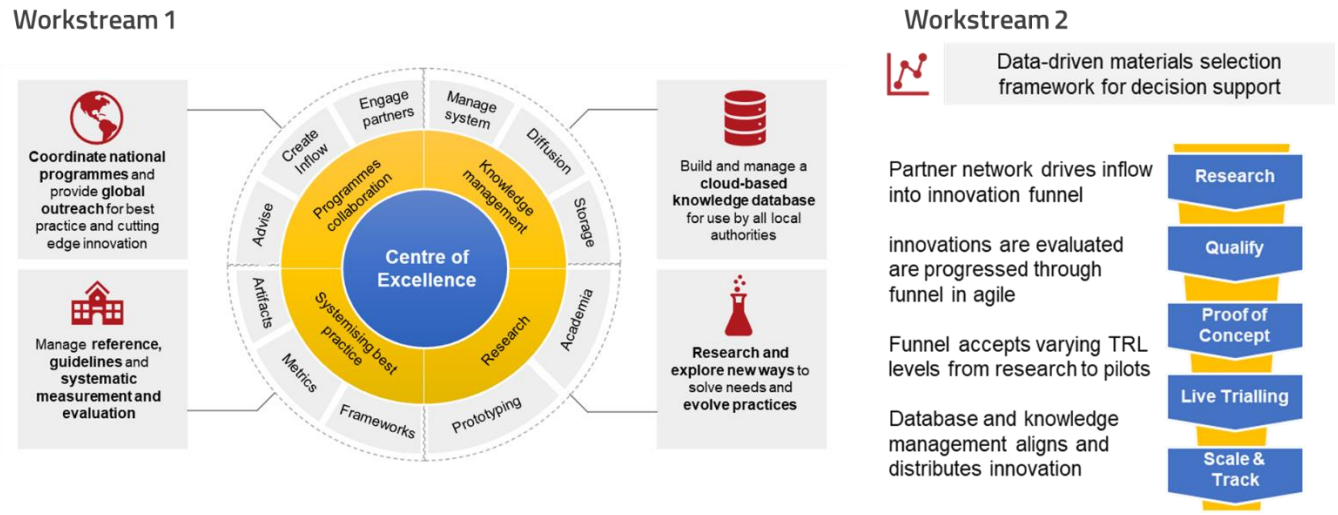


Figure14: CoE scope boundary

The combination of speed and innovation balanced with complex and vast stakeholders requires a hybrid governance framework that provides confidence, clarity and collaboration.

There are three distinct workstreams: Delivery (The Doing), Governance (The Doing it right) and Engagement (Informing stakeholders).

The delivery workstream applies an agile focussed governance model and cadence to keep track of decisions, changes, and benefits, and to provide timely insight and direction. The standard Sprint cycle is applied however the durations will more likely be months than weeks. The Sprint cycle remains characterised by the three stages of Definition, Execution & (Iterative) Review, Retrospective (evolve and embed) and are book ended by a pre-Sprint definition and post- Sprint reflection Steering Group to provide direction and knowledge sharing.

6.4. Support Statements

North Lanarkshire Council: "The council declared a climate emergency in 2019 and we have already surpassed our 2022 target by reducing our carbon footprint significantly. We are seeing the impact of climate change with more severe weather and we all must do more to reduce the harmful emissions we produce. As a council, we are well placed to drive and influence a change in behaviour. The transport sector accounts for a large portion of the emissions and here in North Lanarkshire we want to be at forefront of innovation and developing solutions to this crisis. I believe we have assembled an excellent network here and across Scotland which will enable to facilitate the radical shifts required. This is a fantastic opportunity to be a driver for change and make North Lanarkshire a Centre of Excellence to support the whole industry." – Cllr Kenny Stevenson, Convener of Communities & Regeneration Committee

Amey PLC, Delivery and Project Partner: *"Amey views the Live Labs 2 programme as a critical component in the journey of the highways industry to reach carbon net zero. We will work alongside North Lanarkshire Council to deliver a creative, robust, and outcome-based programme to help accelerate the journey to net zero.*

Reducing carbon and improving sustainability is viewed as a critical success factor for the organisation and we are delighted to have the opportunity to be a part of this programme. We strongly support the overall objectives of the Live Labs 2 mission and commit to active sharing of the outcomes, failures, and successes of the programme." – Andy Denman, Highways Sector Direction, Amey

Transport for the West Midlands: *"Statement of support: Working with our established Highway Maintenance stakeholders we've identified the problems blocking progress towards decarbonisation of local roads. This bid addresses each of them to build a regional, national, and potentially global powerhouse for decarbonisation of highways. This isn't just a bid that will last 3 years, this is a movement to decarbonise highways throughout the UK and beyond"* Mark Corbin – Director of Network Resilience, Transport for the West Midlands

The Connected Places Catapult: *"Statement of support: I am thrilled to express my full support for this ground-breaking innovation project. We are proud to collaborate with such a forward-thinking team that is committed to developing sustainable solutions for the challenges facing our planet. The project's innovative approach and potential to have a significant impact on the environment are truly inspiring. I believe this project has the potential to make a significant contribution to our collective efforts to build a more sustainable future"*

6.5. Project Plan (ref to Appendix A)

Please find the project plan in the documents below. The project plan has also been submitted as an attachment to the email submission.

6.6. Risk Register (ref to Appendix B)

Please find the risk register in the documents below. The risk register has also been submitted as an attachment to the email submission.

7. The Carbon Case

How proposals will measure and reduce carbon with a focus on scope 2 & 3.

Content	ADEPT & DfT Requirements	OBC section
Carbon Baseline	Description of a carbon baseline estimation and reduction target relative to that.	7.1
Carbon Benefits	Description of your expected carbon benefits / reductions broken down by intervention type and cross referencing to estimated whole life cost per tonne (as so far as is possible at this stage) and categorised (e.g. % through lower carbon materials, % through low carbon fuels / electricity / hydrogen, % through design efficiencies)	7.2
Carbon Measurement	Description of your approach to carbon measurement across the lifecycle (capital, operational, user, end-of-life) associated with your proposal / interventions including details of proposed tools, methodologies and source data	7.3
Residual Emissions	Description of your approach to the quantification of residual emissions that cannot be cut (i.e. unavoidable emissions).	7.4
Academic Partners	Details of any academic or industrial partners who may be assisting in this process, their roles and commitment.	7.5

Table 114: ADEPT & DFT requirements for Carbon Case

7.1. Carbon Baseline

The programme does not yet have a definitive schedule of trial interventions and as such baseline emissions are to be calculated on a trial-by-trial basis. It is possible to estimate baseline emissions for several key construction elements associated with highways projects whilst accepting that interventions may be trialled outside of these areas and for which calculation of additional baselines may be necessary.

To establish a carbon baseline estimation, data has been collated for emissions associated with typical practise for highways construction and greenhouse gas emissions have been calculated for the following elements: 1) Asphalt 2) Concrete Rebar 3) Lighting columns 4) Signage

Table 1 below presents baseline carbon emissions for includes some typical materials/construction methods together with baseline carbon emissions associated together with estimated targets.

7.2. Carbon Benefits

At this stage of the project, we are unaware of what the final interventions chosen for analysis will be. As a result, we have presented examples of typical emissions reductions attained from previous innovations applied to real world projects.

Estimated savings achieved by interventions are presented in Table 12. They are provided as an indication of the scale of savings achievable.

Material	Category	Baseline		Example Intervention		Saving
Asphalt	Construction Method	Hot Rolled Construction Method Asphalt	0.24tonCO_2e/m3 (ICE 3.0)	Cold Rolled Construction Method Asphalt	0.21tonCO_2e/m3 (ICE 3.0)	12.5%
	Binder Content	3% binder content	0.06tonCO_2e/ton (ICE 3.0)	7% binder content	0.07tonCO_2e/ton (ICE 3.0)	17%
Concrete	Cement Content	Average CEM I, Ordinary Portland Cement (OPC)	0.91tonCO_2e/ton (ICE 3.0)	CEM II/B-S - 28% GGBS	0.672 ton CO_2e/ton (ICE 3.0)	26.2%
	Structural repair method	Breakout and replacement of defective concrete		Impressed Current Cathodic Protection - Undergoing trial with Balvac on M8 Woodside		
Rebar	Recycled Content	Virgin Steel	2.9tonCO_2e/ton (OneClick)	97% recycled steel	0.53tonCO_2e/ton (OneClick)	82%
Lighting Columns	Recycled content	General European Aluminium	6.67kgCO_2e/kg (ICE 3.0)	Aluminium recycled using renewable electricity	4.0kgCO_2e/kg LINK Hydro REDUXA	40%
	Material type	Standard aluminium/steel columns		Composite Columns ▪ Fibre-Reinforced Polymer (FRP) Columns ▪ Glass Fibre Reinforced Polyester (GFRP) Columns -Lighter, less maintenance (no rust)		TBC

Table 12 5: Carbon Baseline and Target Information

7.3. Carbon Measurement

Project Carbon Framework for ongoing measurement across the highway service

The programme will use the full range and tools offered by the FHRG to assess and baseline the interventions on our live lab programme, in addition, we will also take additional steps, including:

Behaviour, Culture, Training, Understanding

We will work with the authority to undertake workshops to understand the current state of play with regards to understanding of the carbon challenge and the changes that need to be made to support decarbonisation. A programme that transforms each layer of the organisation and TMC provider will be fundamental to the programme's legacy.

Data

Materials will be evaluated against a common baseline with critical success factors considered before being added to the CoE database. The platform will store case studies on successful and unsuccessful innovations to ensure work is not duplicated, and valuable lessons learned are shared industry wide.

The data required will be independently verified in order to baseline and continually monitor and measure carbon. Following this, a funded data collection programme will be provided to collect the missing data sets required, and feedback to the FHRG CCAS.

The programme will complete a full review of the current market and leading innovations, where all materials are baselined against FHRG standards and integrated with the FHRG toolkit. The database will be maintained up to five years after the programme end date, after which further funding will be identified to maintain the use of the database.

OneClick LCA will be used in conjunction with the FHRG tool where appropriate. Use of this industry standard software will be beneficial as it will assist in the development of the FHRG tool through comparison of the two models. OneClick has a vast materials database which will be of value when benchmarking low-carbon materials within a group. Furthermore, the two different tools may have strengths in modelling different interventions, such as modelling generalised datapoints versus EPDs.

For contractors to provide the information for modelling consistently and sufficiently, a standardised data provision specification will be developed. This will ensure sufficient baselining instrumentation and monitoring to enable effective data collection from the interventions being trialled. Each project will have a data management plan. A workshop will be arranged with contractors to ensure understanding of the plan, and templates provided to ensure that data is provided in the correct manor.

Process Mapping

Building upon our initial analysis and to fully understand the carbon emissions from lifecycle planning, we will produce a detailed process map so that we can identify what materials have largest carbon emissions and largest potentials for reduction, and therefore what areas need to be focused on.

Quality Assurance

It is important to implement a quality assurance process so that we are confident that our process and tool are accurate for uses with both North Lanarkshire and the SCOTS group. We will then be able to demonstrate to others that our Project Carbon Framework can deliver the required reporting. The proposed process includes reviews of the following: Reuse and retrofit, Use of recycled materials, materials selection, minimise operational energy & water use, regenerative design, designing for durability and flexibility.

Business as Usual

In order to fully address the scale of the carbon challenge in our industry, it is critical that our focus on carbon reduction becomes business as usual. We will ensure that the processes developed through the Live Labs programme are fully embedded with all teams within highways and the right culture is in place to continue the processes once the official Live Labs programme has ended.

7.4. Residual Emissions

The baseline emissions model the whole carbon emitted as a result of a construction element, therefore, once savings are identified quantification of residual emissions will automatically be modelled.

As previously discussed, baseline emissions are calculated as the total emissions within the scope of the project. I.e., the sum of Capital, Operational and End of Life emissions associated with:

- Embodied emissions of construction materials
- Transportation emissions of materials and people
- Operation of plant and equipment during construction period
- Operational electricity, fuel, and water emissions
- Maintenance, repair, and replacement emissions
- End of life emissions including deconstruction and waste processing

The project will monitor carbon savings associated with the proposed interventions.

- Residual emissions will be calculated by taking monitored emissions associated with these interventions from the baseline.
- Significant changes to the elements making up the baseline will be incorporated in a process of updating the baseline emissions on a regular basis such that any impact on the project can be addressed.

Data Management and Sources

In the initiation phase of projects, a specific data management plan will be prepared. This will identify the key stakeholders and resources to be used to work with the data to monitor carbon emissions and prepare suitable reporting. This will also include confirmation of personnel to be tasked with:

- Managing the process.
- Implementing and operating systems to obtain data.
- Preparation of regular progress updates and annual reporting as required.

Data will be held on a Project Sharepoint site for ease of access and regular update.

Table 13: Identified Proposed Information *Sources*, identifies potential sources of information that may be used to baseline and monitor carbon performance. Whilst it is anticipated that in the process of starting a project additional and/or alternative sources may be identified it is considered that this table will form the core of the data gathered.

Element	Potential Data Sources Baseline Phase	Potential Data Sources Monitoring Phase
Embodied carbon	Estimated materials quantities will be obtained from proposals and outline designs. Carbon factors will be sourced from databases within the commercially available software. Embodied carbon emissions associated with new equipment purchased for the purposes of this project will be estimated using data sourced from databases within the commercially available software given manufacturer's data.	Accurate materials quantities will be sourced from designs and detailed specifications including bill of quantities. Carbon factors will be sourced from databases within the commercially available software.
Transport of equipment and materials to and from site	Estimates of energy consumption and emissions will be made based upon project proposals and	Actual data may be sourced from transport companies and contractors as follows:

	information obtained from previous projects.	• Diesel and petrol consumption of vehicles. • Electricity consumption for EV / plug in hybrid vehicles. • Fuel delivered from bunker storage. • Fuel card data. • Vehicle mileage using GPS data. • UK Government Reporting Emissions factors for vehicles and liquid fuels.
Fuel use on site in plant and equipment	Estimates of energy consumption and emissions will be made based upon project proposals and information obtained from previous projects.	Actual data may be sourced from contractors as follows: • Fuel purchased or delivered from bunker storage. • 2 stroke oil either from procurement/supply data or based on 50:1 ratio.
Carbon sequestration as a result of changes to landscaping maintenance regime	Estimates will be made based upon project proposals and information obtained from previous projects including outcomes from research and published academic papers.	Depending on the scope of the project to be estimated as per the baselining stage or the subject of onsite specialist investigation.
Disposal of waste	Estimates will be made based upon project proposals and information obtained from previous projects with emissions factors from UK GHG reporting sources.	Quantification will be provided by Contractors in the form of details from waste transfer notes with emissions factors from UK GHG Reporting data.

Table 13: Identified Proposed Information Sources

7.5. Academic Partners

Partners will be selected on the basis of expertise and value to the specific projects under consideration.

Local Authorities: - North Lanarkshire County Council

To ensure that we have a laser sharp focus on carbon outcomes, the programme will work closely with the FHRG and the Carbon and Sustainability team at Amey to:

1. Use the FHRG Carbon Calculation & Accounting Standards (CCAS) pioneer tool to undertake carbon baselining against which we can demonstrate and quantify the effectiveness of the proposed interventions, focusing primarily on carbon but also giving key consideration to cost, social impact and other metrics. We are keen to ensure that we are supporting other initiatives in the sector that will provide a singular approach to carbon calculating and measuring.
2. Create a Project Carbon Framework for on-going measurement across the highway service
3. Ensure that we focus on the whole life carbon and measure the carbon output at each stage of the material or asset life cycle.

8. Equality Impact Assessment

Content	ADEPT & DfT Requirements	OBC section
Approach	An Equality Impact Assessment to highlight (as defined by s149 Public Sector Equality Duty – Equality Act 2010) how people from the protected characteristics will benefit from proposals and how they will ensure that any possible negative impacts are mitigated early on	8.1
Engagement	We expect engagement with relevant stakeholders who represent people from the protected characteristic groups	8.2
Objective	Stakeholders to be consulted; relevant research/data; potential positive equality impacts; potential negative equality impacts; mitigations to negative impacts; and how the impact on equality will be monitored throughout the lifetime of the proposal	8.3

Table 14 6: ADEPT & DFT requirements for Equality Impact Assessment

8.1. Equality Impact Assessment

Approach to EDI

North Lanarkshire and the wider programme partners value, celebrate and embrace Equality, Diversity, and Inclusion (EDI). Our aim is to deliver a Live Lab that results in tangible value and outcomes for the UK taxpayer. To achieve this, it is important that we have an environment which promotes equality, inclusivity, and champions the diversity of its workforce. The Council's ambition is for North Lanarkshire to be the place to live, learn, work, invest and visit for all people.

To address the challenges, we face within the roads & highway materials market, it is critical we consider a wide range of views from different groups, individuals, and organisations.

The CoE is reliant on cross industry and sector collaboration on a global scale and therefore naturally brings a wide range of voices, opinions, and ideas. The process and outcomes from this project will support the change required to tackle these challenges. We seek to create a culture where equality commitments are embedded into every aspect of the programme, with diversity and inclusion as a key value driver in the success of the Live-Lab.

Our approach will focus around four key areas:

Promoting and supporting a diverse and inclusive project team and supply chain
We will:

- Ensure our workforce reflects our values, and is diverse in knowledge, experience, and capability to ensure our perspective remains broad
- Establish opportunities for career development and progression within the team and ensure under-represented groups are seen
- Commission a positive actions programme that includes mentoring, experience days and career progression schemes

Creating a culture of inclusivity, respect, and trust
We will:

- Create an environment where people can work in a culture that promotes respect and inclusion

- Have zero-tolerance towards discrimination and bullying/harassment
- Implement reverse mentoring opportunities

Having visible and involved leadership
We will:

- Demonstrate our commitment to equality and diversity through visible and vocal commitments from our team
- Establish an EDI champion within the delivery and governance groups

Establishing EDI in our practices and policies
We will:

- Evidence our EDI commitment through explicit commitments within our policies and project practices
- Review our policies and practices alongside diverse groups to ensure fairness
- Establish checks and balances during the programme that will traffic light EDI
- Deliver fair and equitable recruitment into the programme
- Assess and mitigate against potential barriers for entry for underrepresented groups.

8.2. Relevant Stakeholders Engagement

In the first 2 months following the commencement of the programme, as a minimum we will engage with the following groups:

- Enable North Lanarkshire
- North Lanarkshire Ethnic Minority Action Group
- North Lanarkshire Disability Forum
- DisabledGo – North Lanarkshire

After which periodic and ad-hoc engagement sessions will be set up.

8.3. Objective

We have identified important differences in barriers, experience and participation regarding highway design and management, of people from EDI groups particularly for people with physical, sensory, and motor disabilities, people who are neuro diverse and people from lower socio-economic groups due to transport cost barriers limiting their travel options often to walking or wheeling.

Our aim is to deliver a Live-Lab that delivers positive outcomes for everyone in society, particularly for people with protected characteristics and people from low socio-economic groups. To achieve this, an initial Equalities Impact Assessment and Plan will be prepared through engagement with EDI stakeholder groups from North Lanarkshire Council in planning and all stages of the project. This will include engagement with the North Lanarkshire Disability Forum, North Lanarkshire Ethnic Minority Action Group and other relevant groups.

Each demonstrator site will include an EDI assessment and identify key local stakeholders that represent the diversity of the local community. Different solutions may need different communications approaches. Therefore, we will seek solutions and communication strategies that consider different experiences/barriers and circumstances.

9. Monitoring & Evaluation

Content	ADEPT & DfT Requirements	OBC section
Activities	Details of any local, tactical M&E activities related to your proposals and constituent elements, their performance, and impacts These should be aside from those being undertaken at the programme level	9.1
Outputs	Outputs should allow others to fully understand benefits of proposals and allow them to capitalise upon them	9.2
Methodology and Partners	Details of methodologies / tools to be employed and any academics / suppliers associated with the work	9.3

Table 15 7: ADEPT & DFT requirements for Monitoring & Evaluation

9.1. Relevant Tactical M&E Activities

9.1.1 Overview

The programme will undertake a series of strategic, tactical and local activities that are specific to the requirements of our programme and will assess the approach, outcomes and benefits of the Centre of Excellence. The activities will be both directly and indirectly complement those being undertaken at the Live Labs programme level. This will enable us to verify whether the project has been successful in achieving its aims in alignment with the project's Theory of Change model. Data collection will be conducted throughout both the three-year project duration and the five-year monitoring and evaluation period.

9.1.2 Data Capture

We will collect both quantitative and qualitative data which will include but not be limited to the following:

- Carbon footprint data in line with our Carbon Case as outlined in section 6.
- Asset performance data: we will measure the impact decarbonisation has on the highway assets performance, particularly where we have used an innovative material or new maintenance approach. As a minimum this will be monitored through routine Scanner, Coarse Visual Inspection (CVI), routine safety inspections, defect history, photographs and griptester surveys.
- Industry engagement data: Capturing stats on the number people and organisations who engaged with the Centre of Excellence, either through our webpage or other communication channels. We will also capture the broad demographics of those engaged with us throughout the project.
- Public perception data: Public satisfaction / perception data will highlight any social and technical issues caused by decarbonisation in the demonstrators and how the material innovation deployed effects the customer.
- Cost data: The cost of materials deployed when compared with the current standard, cost to scale and predicted cost if material was deployed at scale and integrated into BAU. This data will be compared to the with the whole life cost of the current local and industry standard.

- Operational data: we will collect details of the required change to operational delivery, including time on site, type of traffic management required, and equipment or expertise required to install and maintain the asset.
- Culture change: we will conduct annual surveys of our project teams (both local authority and term contractor) to assess changes in behaviour, attitudes towards decarbonisation, risk and innovation.
- Standards and Specifications: Monitoring the changes made to the standards and specifications such as the Design Manual for Roads and Bridges (DMRB)
- Social Value: we will use the TOMS framework to evaluate the social impact of alternative approaches ranging from biodiversity scores to employment and volunteering that has been generated through the new approach to working.
- EDI: we will monitor the diversity of the team delivering the project throughout its duration and the diversity of people engaged through demonstrator sites as part of project specific EDI Assessments.

This data will then be used for the following **Strategic Monitoring and Evaluation Activities:**

9.1.3 Carbon Evaluation

As per section 7

9.1.4 Behaviour Change

We will work with behavioural change experts at Behavioural Insights to monitor, evaluate and support behavioural change across three core areas.

1. North Lanarkshire Council's employees' attitudes towards innovation and risk, employees who are directly and indirectly involved within the programme will be invited to take part. The purpose is to assess the impact of large scale innovations programmes on the behaviour and attitudes of employees to innovation and change. In addition, to deploy measures to will help drive an innovative culture at North Lanarkshire Council. This change is crucial in an industry often considered to be slow to accept and adopt change, the need to change our thinking is vital if we are going to address the carbon and other crucial challenges faced across the local authority sector.

2. To assess, evaluate and advise on measures to help implement and scale innovation, remove the barriers to change within the management and front line work force within the council and term maintenance contract providers.

3. Has carbon impact has become more prominent in the decision making process in the highways division and across North Lanarkshire Council.

Behavioural Insights will deploy numerous techniques to gather and evaluate data and make recommendations on interventions to induce change, this includes Surveys, employee interviews, focus groups, measuring innovation key performance interviews and anecdotal data.

9.1.5 Programme / Centre of Excellence Engagement

Data will be used to evaluate the effectiveness and reach of the Centre of Excellence, data gathered will include:

- Number of local authorities and suppliers who have directly engaged either in idea submission to programme outputs

- View of functionality and content, as well as “usefulness rating” of the Centre of Excellence its functions
- Other local authorities trust in the output and outcomes from the Centre of Excellence
- Website views and data downloads
- External trials delivered
- Number of CoE materials adopted across the Highways Sector at the end of the initial period and after the five-year monitoring and evaluation period.
- International engagement

9.1.6 Customer Experience

We will gather customer perception data and on the user experience and impact the trials and innovations have on the network.

As part of our communications strategy, we will launch a campaign to inform users, through social media and VMS, on any disruption and the carbon reduction initiatives that are being trialled. In our customer perception surveys and other data gathering techniques, we will ask customers whether the knowledge that any disruption faced is for environmental benefits had any impact on their view and tolerance of the activity.

We are hoping to understand two areas:

1. Impact of the materials trialled on the customer experience.

2. Whether knowledge of trials and cause of disruption impacts customer tolerance of any network disruption. We hope this evidence can be used to greater inform customers of disruption, aid future support for environmental trials, both in North Lanarkshire and across the LA network.

9.1.7 Social Value

We will use the TOMS framework to evaluate the social impact of alternative approaches ranging from biodiversity scores to employment and volunteering that has been generated through the new approach to working.

The National TOMs social value proxies (the Proxy Values) are developed from adaptations of cost benefit analysis and appraisal techniques as outlined in the Treasury Green Book and other relevant public-sector guidelines (See Bibliography). In technical terms, the Proxy Values require the valuation of “non-market goods and services” and the National TOMs approach aims to be consistent with the relevant techniques outlined in these guidelines.

9.1.8 Standards and Specifications

The programme will measure the impact how the outputs of the trial have impacted highway specifications and standards.

9.2. Outputs of Benefits

The process and outputs will be captured in a benefits tracker, with detailed explanation of the out process, rational and outcome. Each strategic area will also produce periodic updates and a final report that will be shared via the programmes communication channels and made available to the central programme.

9.3. Methodologies / tools to be used Behavioural Insights

Behavioural Insights will provide the support to monitor, evaluate and support behaviour change in the organisation. Behavioural Insights will deploy a range of methodologies throughout the programme. The specific methodologies will be determined as part of the detail scoping expertise due to commence in June 2023.

Amey

Amey will deliver social value insights and evaluation. Amey has experience and expert knowledge in the TOMs framework and has conducted multiple reports and studies on the impacts of actions, schemes, and activities as part of their role delivering term maintenance contracts and other local authority services.

TOMS aims to bridge the gap between the public and private sectors, recognising that it is only through collaboration and partnership that success will be achieved. Community is at the centre of everything that the framework aims to deliver. Participants are encouraged to share their successes and failures in order to build collective knowledge and strengthen the uptake of the Act across all sectors. The purpose of the evaluation is to drive Social Value best practice in an open and collaborative forum that allows social value to be more widely adopted across all sectors and organisations. We this Framework is essential to enabling us to make an increasingly meaningful contribution to the creation of healthy, thriving, sustainable and resilient communities.

10. Sharing, dissemination and working

Content	ADEPT & DfT Requirements	OBC section
Approach	Your proposal for continual sharing and dissemination inc white papers, blogs, thought leadership etc.	10.1
Activities	Your proposals for marketing and communications activities to mesh with those at the strategic programme level including the use of local expertise	10.2
Compliance	A statement that you will adhere to the collaborative, open and sharing spirit of Live Labs 2 and in addition what you will bring to enhance that working	10.3

Table 16 8: ADEPT & DFT requirements for Sharing, Dissemination & Working

10.1. Continual Sharing and Dissemination

As the UK's Centre of Excellence for Materials Decarbonisation in Local Roads, communications, networking, and knowledge sharing will be at centre of our live lab. We also recognise that knowledge sharing is critical to the success and scalability of the Live Lab programme. From the structure of the programme to resource and cost allocations, knowledge sharing will be a key consideration at each stage.

To gather the leading innovations in low carbon materials and ensure outcomes and learning will be shared across the sector we will be focusing on five key objectives specific to our CoE proposal.

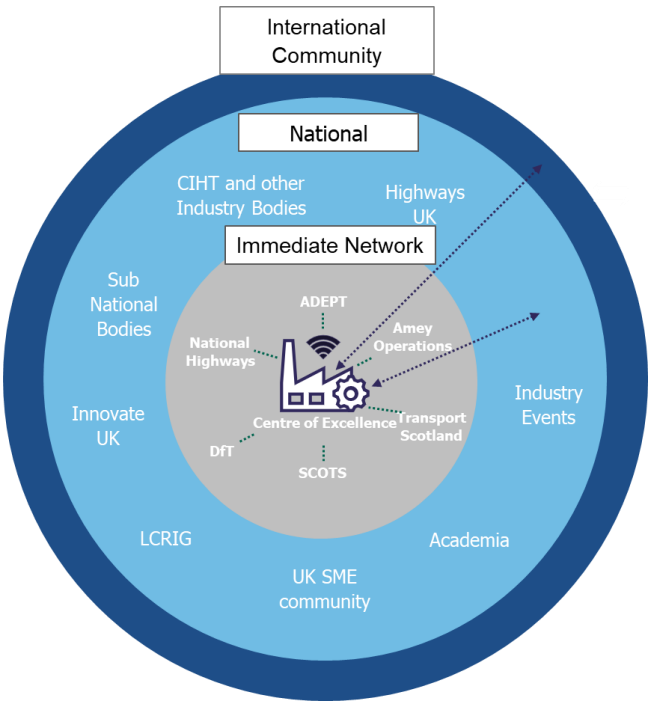
1. Building a strong Centre of Excellence brand
2. Attracting innovations
3. Avoiding duplication
4. Sharing and dissemination of learning
5. Influencing Change

The activities above relate to our wider strategic communication objectives, the activities for the remainder of section 11.1 will focus on area 4, the sharing and dissemination of the learning.

Our approach is built around four core elements:

Curating the right knowledge management items

At the beginning of the programme, we will set out exactly what our collateral should be, what information should be shared and with who, this will be evaluated and evolve throughout the programme with communication plan reviews occurring on a monthly basis. This includes internal lessons learnt, as well as useful knowledge shared publicly, trial updates and detail about the methodologies we are using to deliver the programme. Dedicated comms resource will be assigned to support both the core programme and communications undertaken by ADEPT.



Having the right governance, processes, and incentives to share effectively

We will set clear standards for sharing, pathways for knowledge flow and ownership within the team. We will ensure knowledge sharing is built into core programme metrics that are reviewed on a monthly basis and are managed as part of core programme delivery.

Our programme team

Using a Knowledge Base to aggregate and store knowledge

We will develop a digital knowledge base to store and coordinate all elements of our information on the programme. This will be used both by internal team members, as well as being made accessible to other councils and interested parties. We will use established document

management methodologies to ensure people can search and scan through the Knowledge base quickly, e.g., using data tags.

Implementing a robust programme of knowledge sharing activities

The activities for knowledge sharing will include but not be limited to: Developing a programme specific communication strategy, Blogs and social media, Peer reviews, Conference attendance and speaking, After action reviews – shared with ADEPT, Centre of Excellence Website, Open project plan and key dates, Quarterly seminars / webinars, White papers, Materials database, Bi-Annual show and tell sessions, Programme kick off and engagement event, Outcomes shared and integrated into university modules at Heriot Watt, build in learning & outcomes into the SCOTS Roads Asset Management Project and Short sharp 'lessons learnt' profiles.

Bringing together UK and global industry experts, under established governance frameworks will ensure lessons are disseminated across multiple Road and Highway Authority networks. Therefore, the interlinkages with ADEPT, FHRG, Transport Scotland, National Highways and others industry bodies will be key to ensuring transfer of both previous lessons learned to avoid duplication and outcomes from the programme.

10.2. Marketing and Communications Activities

The programme will put in place a robust communications plan that will include but not be limited to the activities outlined in section 11.1 of this document. In addition to following the communication guidance issued by ADEPT we also pledge the following to link all activities bank to the overall programme.

Enhanced Live Labs Promotion / Awareness: Alongside the core activities required as part of the programme, the Centre of Excellence will go a step further in a collaborative comms approach and promote the purpose and wider Live Lab efforts in everything that we do. When a call to action is communicated to industry, SME market or the international supply chain. The wider programme and other live labs will be included in this comms, helping drive innovation and new ways of working into the programme.

Website: We will be creating a website to share details of the Centre of Excellence, host the database and other activities as part of the knowledge share. Across the page will of course be following the communications guidance and governance but also include references to other projects, ADEPT material, and constant links to the Live Labs programme as a whole. Creating greater traction for the programme.

Workshops / Roundtables: We understand our communications reach is not only what we put out on social media or via our webpages. We need our message to travel through the industry and want to support the other live lab programmes in doing the same. Throughout the programme we will be hosting industry roundtables to generate ideas, evaluate options, sense check with industry and share failures as well as success. Throughout the process will promote the wider programme and invite other live labs to share their message or engage with relevant leaders invited to the discussions.

Events: The CoE are intent on speaking at and having presence at highways events, focusing on years 2-3 to share the learnings and progress of the project. We will include the wider programme messages at these events and promote the programme as a whole.

10.3. Collaborative Working

North Lanarkshire Council and Amey will adhere to the collaborative, open and sharing spirt of the Live Labs 2 programme. Both parties are passionate about the ADEPT Live Labs mission and are

fully committed to the ethos of the programme. Working collaboratively and sharing learning is the only way that we can achieve the step changes needed to fight climate change.